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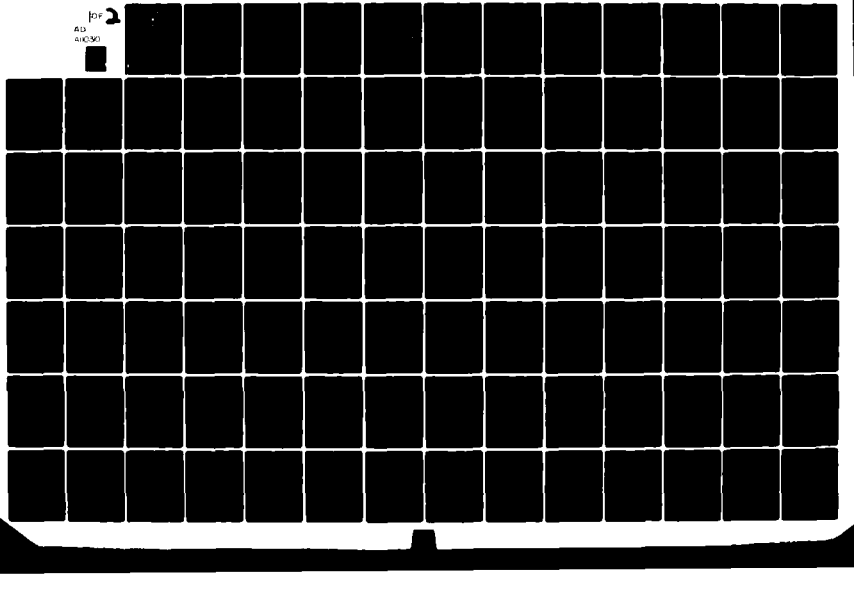

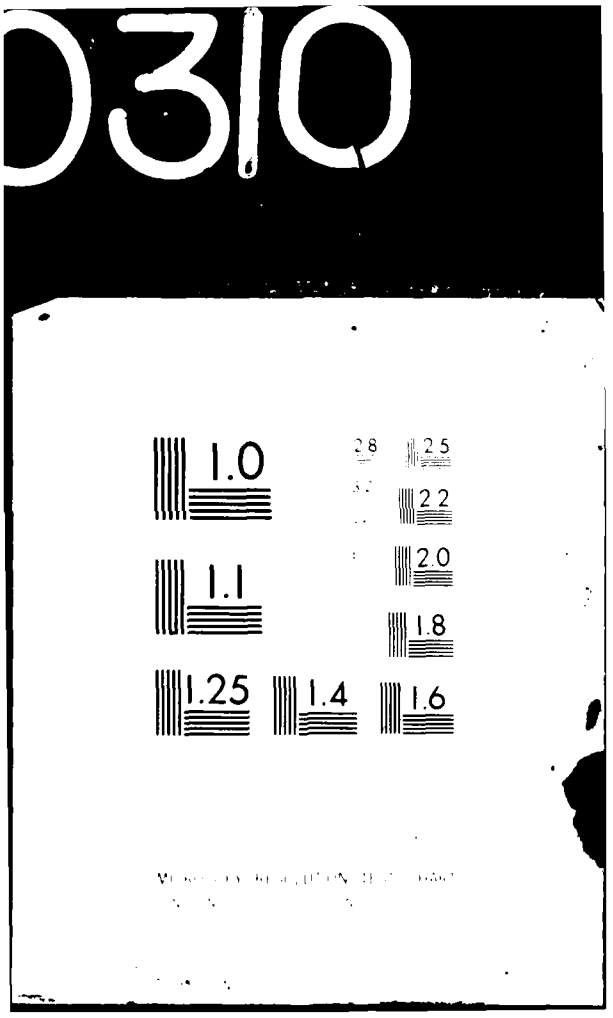
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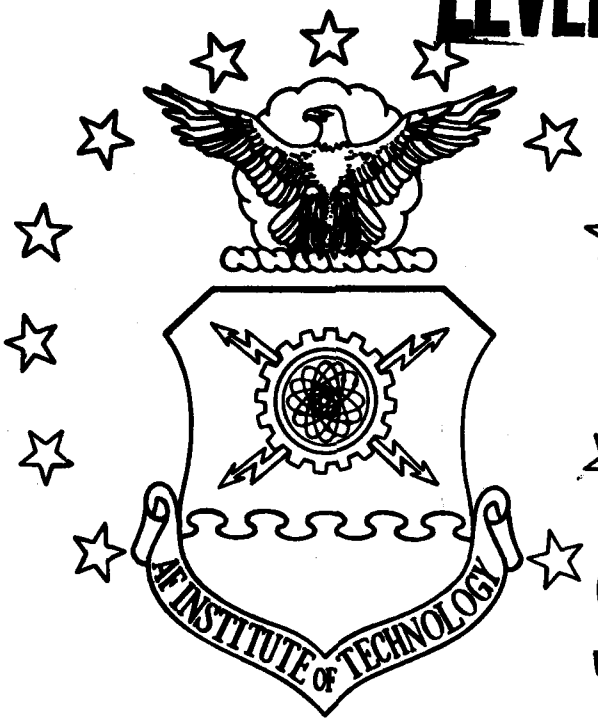


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# IMPACT OF THE SHORTAGE OF MAJOR AND CAPTAIN CIVIL ENGINEERING OFFICERS ON THE BASE-LEVEL ORGANIZATION

William M. McDonald, Captain, USAF
Constantinos P. Leoutseas, Captain, Hellenic AF

LSSR 64-81

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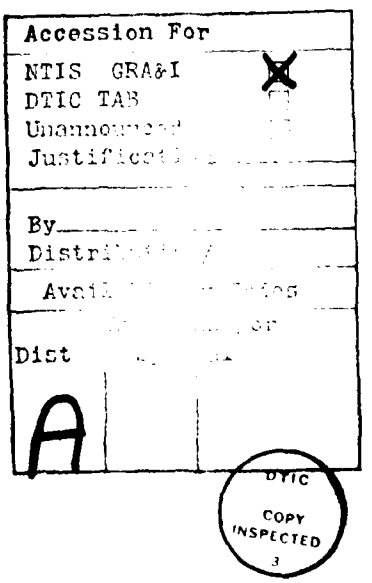

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| 1. REPORT NUMBER: LSSR 64-81 | 2. GOVT ACCESSION NO.: AD-A110310 |
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| 4. TITLE (and Subtitle): IMPACT OF THE SHORTAGE OF MAJOR AND CAPTAIN CIVIL ENGINEERING OFFICERS ON THE BASE-LEVEL ORGANIZATION | 5. TYPE OF REPORT & PERIOD COVERED: Master's Thesis |
| | 6. PERFORMING ORG. REPORT NUMBER |
| 7. AUTHOR(s): William M. McDonald, Captain, USAF<br>Constantinos P. Leoutseas, Captain, Hellenic AF | 8. CONTRACT OR GRANT NUMBER(s) |
| 9. PERFORMING ORGANIZATION NAME AND ADDRESS: School of Systems and Logistics<br>Air Force Institute of Technology, WPAFB OH | 10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS |
| 11. CONTROLLING OFFICE NAME AND ADDRESS: Department of Communication and Humanities<br>AFIT/LSH, WPAFB OH 45433 | 12. REPORT DATE: September 1981 |
| | 13. NUMBER OF PAGES: 167 |
| 14. MONITORING AGENCY NAME & ADDRESS(if different from Controlling Office) | 15. SECURITY CLASS. (of this report): UNCLASSIFIED |
| | 15a. DECLASSIFICATION/DOWNGRADING SCHEDULE |

16. DISTRIBUTION STATEMENT (of this Report)

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17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

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18. SUPPLEMENTARY NOTES

APPROVED FOR PUBLIC RELEASE AFR 190-17.

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

CIVIL ENGINEERING OFFICER SHORTAGE
CE MIDDLE MANAGEMENT
CIVIL ENGINEERING
OFFICER MANNING
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The USAF Civil Engineering career field requires engineers to fill authorized officer manning positions. The retention problem the Air Force is currently having with junior officers is moving upward in the officer ranks to middle management major and captain positions. The Base Civil Engineers were asked their perceptions, through a survey questionnaire, of how and where the shortage of authorized majors and captains was impacting their base-level Civil Engineering organizations. The population of Civil Engineering organizations included CONUS and overseas operating locations. The conclusions of the research study indicated that the shortage of authorized major positions was concentrated in the Operations Branch. The authorized major position perceived as most severly impacted was the Chief of Operations. The shortage of authorized Civil Engineering captains was perceived to be concentrated in the Engineering and Environmental Planning Branch. However, the concensus of Base Civil Engineers agreed that the key authorized captain position was the Chief of Resources and Requirements in the Operations Branch.

LSSR 64-81

# IMPACT OF THE SHORTAGE OF MAJOR AND CAPTAIN CIVIL ENGINEERING OFFICERS ON THE BASE-LEVEL ORGANIZATION

A Thesis

Presented to the Faculty of the School of Systems and Logistics

of the Air Force Institute of Technology

Air University

In Partial Fulfillment of the Requirements for the

Degree of Master of Science in Engineering Management

By

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Captain, USAF

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September 1981

This thesis, written by

Captain William M. McDonald

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has been accepted by the undersigned on behalf of the faculty of the School of Systems and Logistics in partial fulfillment of the requirements for the degree of

MASTER OF SCIENCE IN ENGINEERING MANAGEMENT

DATE: 30 September 1981

Lt Col Arthur T. King, PhD
Thesis Chairman

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

# CHAPTER I

# INTRODUCTION

## Background

The number of people assigned positions in the U.S. Air Force Civil Engineering officer career field, Air Force Specialty Code (AFSC) 55XX, has been below the Air Force authorized manning requirements since the discontinuance of the national draft which occurred in January, 1973. As examples, in May 1979, the officers assigned to Civil Engineering positions were 91 percent of the total authorized Civil Engineering officer positions; in May 1980, 89 percent of the total authorized positions were assigned; and the projection for Civil Engineering (CE) officers assigned compared to those positions authorized for May 1981 was 88 percent. The personnel manning records, maintained by Palace Blueprint, the career progression specialists for Civil Engineering officers, Air Force Military Personnel Center (AFMPC) at Randolph AFB, Texas, will verify these shortages. Table 1 summarizes the number of Air Force authorized and assigned Civil Engineering officers from 1975 to 1980 and presents a tentative projection for the year 1981. One substantial variable, in the continuing difference between CE officers authorized and those officers assigned, is the retention of new officers entering the Air Force Civil Engineering career field.

On the average, only 35 percent of the people entering the Civil Engineering career field, as newly commissioned second lieutenants, remain in the Air Force beyond the four year committment time period (9).

TABLE 1

CIVIL ENGINEERING (55XX) MANNING (9)

| | 1975 | | | 1976 | | | 1977 | | | 1978 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Auth | Asgn | % | Auth | Asgn | % | Auth | Asgn | % | Auth | Asgn | % |
| Col. | 137 | 99 | 72 | 136 | 124 | 91 | 134 | 126 | 94 | 132 | 122 | 92 |
| Lt. Col. | 280 | 255 | 91 | 262 | 270 | 103 | 257 | 249 | 97 | 261 | 258 | 99 |
| Major | 388 | 362 | 93 | 372 | 345 | 93 | 329 | 318 | 97 | 334 | 284 | 85 |
| Captain | 825 | 599 | 73 | 782 | 641 | 82 | 825 | 629 | 76 | 819 | 613 | 75 |
| Lt. | 337 | 468 | 139 | 323 | 475 | 147 | 322 | 472 | 147 | 312 | 496 | 159 |
| | 1967 | 1783 | 91 | 1875 | 1855 | 99 | 1867 | 1794 | 96 | 1858 | 1773 | 95 |

| | 1979 | | | 1980 | | | 1981* | | |
|---|---|---|---|---|---|---|---|---|---|
| | Auth | Asgn | % | Auth | Asgn | % | Auth | Asgn | % |
| Col. | 129 | 117 | 91 | 130 | 111 | 85 | 130 | 105 | 81 |
| Lt. Col. | 259 | 239 | 92 | 271 | 221 | 82 | 270 | 209 | 77 |
| Major | 337 | 264 | 78 | 351 | 279 | 79 | 338 | 263 | 78 |
| Captain | 653 | 521 | 80 | 846 | 502 | 59 | 879 | 496 | 56 |
| Lt. | 466 | 543 | 116 | 356 | 634 | 178 | 376 | 677 | 180 |
| | 1844 | 1684 | 91 | 1954 | 1747 | 89 | 1993 | 1750 | 88 |

*Projected for May 1981.

Officers entering the CE career field under the Rated Supplement Officer Plan, remain in the CE career field for approximately three years and then return to flying duties (9). Studies and research projects have investigated the causes and problems of retention of CE career field officers and recruitment of engineers for the entire Air Force. The Literature Review chapter of this thesis contains sources that more thoroughly reviews the problems of retention of Civil Engineering career field officers. The Literature Review chapter also addresses the retention and recruitment of students in the engineering field into service with the U.S. Air Force. The problem of retaining new second lieutenants past the four year point and keeping rated supplement flying officers in the Civil Engineering career field past the three year time point is presenting an increasing challenge. That challenge is to maintain the officers assigned to the CE career field at the current assigned level or improve the number of assigned CE career field officers relative to the number authorized.

The CE officer retention problem coupled with the retirement of many senior Civil Engineering career field officers is also causing an increasing shortage in the major and captain management positions of the base-level Civil Engineering organizations. The major and captain management levels or collectively, middle management, of the Civil Engineering officer career field recommend or make many of the decisions concerning expenditure of public funds and for improving base Civil Engineering organizations. Many key positions in the Administration Branch (DEA) Engineering and Environmental Planning Branch (DEE), Industrial Engineering Branch (DEI) and Operations Branch (DEM) are normally authorized for

major and captain CE officers. In special cases, major and captain officer authorizations are placed in the Housing Branch (DEH) and Fire Protection Branch (DEF) of the Base Civil Engineering organization. This practice is more common overseas. Key major and captain CE positions are authorized within the Administration or DEA/CCQ Branch.

Administration Branch

The Administration Branch (DEA) or Squadron Section Branch (CCQ) are considered one distinctive branch of the Base CE organization for purposes of this thesis. In reality, the two may be seperate branches in some large and medium size CE organizations. The CE Administration Branch is responsible for management of both military and civilian personnel in the squadron. The DEA Branch performs the responsibilities for security of classified materials for the CE organization and acts as information distributor for letters and messages. The Squadron Section Commander, in addition, administers punitive actions within the Uniform Code of Military Justice (UCMJ), coordinates military training requirements, squadron additional duties, commander's call, fund drives, manages publication libraries and performs other duties as directed by the Base Civil Engineer, (BCE) (10:11). The DEA/CCQ Branch is an important middle management position that partly relieves the BCE so that he/she can perform more critical management functions. The Engineering and Environmental Planning Branch also performs critical middle management functions.

Engineering and Environmental Planning Branch

The Engineering and Environmental Planning Branch (DEE) "Directs professional services for the full range of technical design, contract

management, and environmental planning discipline [10:12]". The DEE Branch consists of the Contract Management Section (DEEC), the Engineering Section (DEEE) and the Environmental and Contract Planning Section (DEEV).

The Contract Management Section (DEEC) has the responsibility of making technical contractual inspections of construction and service contracts for the improvement or repair of Air Force real property and equipment. The DEEC Section provides reviews of designed plans and specifications before contract advertisement and inspects work to insure contractor compliance. The section also has the responsibility of collecting construction material samples, reporting on construction schedule compliance, and final contract completion inspections for acceptance by the Air Force. All construction plans and specifications prepared by the Engineering Section are reviewed by the DEEC Section (10:12).

The Engineering Section (DEEE) is charged with the duties to produce, coordinate and design all plans (drawings) and specifications for CE work accomplished by contract. In addition, cost estimates for designs and selection of Architect-Engineer firms to provide services beyond the capabilities of the DEEE Section are also the responsibility of the section. Performing land surveys and measurements, maintaining as-built and record drawings of facilities, and staking underground utilities before construction are other duties of the DEEE Section. Economic analysis of cost benefit ratios for projects and developing and verifying utility bills and rates are also the duties performed by the Engineering Section (10:13). The third section forming the Engineering and Environmental Planning Branch is the Environmental and Contract Planning Section.

The Environmental and Contract Planning Section (DEEV) is responsible for controlling and preventing the pollution of the Air Force base environment. The DEEV Section is also responsible for

> Ensuring compliance with the National Environmental Policy Act, the Intergovernmental Cooperation Act and related legislation as well as executive orders, DMB circulars, DOD directives and instructions and Air Force policies and regulations pertaining to environmental planning and protection [10:13].

In addition, the DEEV Section coordinates with community, regional, urban and state planning boards, developes Air Installation Compatible Use Zones (AICUZ) and is responsible for fish and wildlife management (10:14).

The DEEV Section, the DEEE Section and the DEEC Section of the Engineering and Environmental Planning Branch (DEE) are important to the successful operation of the base-level CE organization. Major and captain CE career field officers fill key positions as leaders of the DEEC, DEEE and DEEV Sections and also fill key management analysis positions in the Industrial Engineering Branch.

Industrial Engineering Branch

The chief of the Industrial Engineering Branch should have an intimate knowledge of the base-level CE organization to perform the important role of "problem solver" to all levels of management.

> Industrial engineering (IE) provides consulting services directed toward increasing work force productivity and improving base level CE resource use. The services the IE provides can include special studies, analysis, application of IE techniques, and development of innovative procedures [11:1-3].

The analysis and correction of problem areas and acting as management advisor to the Base Civil Engineer (BCE) is only one of the responsibilities of the Chief of Industrial Engineering. Controlling the real property

assets of the base in the form of facility utilization management, accounting for real property, and disposition of real property is a second responsibility. Accounting for specific cost of each work order and manhour cost, accumulating cost data for statistical information and performing key punch responsibilities for requirements and systems of the CE organization are additional responsibilities of the Chief of Industrial Engineering. The Chief of Industrial Engineering must have a thorough working knowledge of CE procedures to effectively and efficiently produce quality outputs in the IE management position. The Operations Branch, likewise, requires a thorough knowledge of Civil Engineering.

Operations Branch

The Operations Branch is perhaps the heart of the base-level CE organization. The Chief of the Operations Branch has the responsibilities of directing and controlling the identification planning, ordering material, and accomplishing all work selected for in-service (in-house as opposed to contract) manpower resources (10:15). The DEM Branch performs the daily maintenance, such as putting freon gas into an air conditioning unit; the daily repairs, such as replacing broken windows; and the daily operations, such as running the steam heating plant. The DEM Branch is responsible for recovering the base from natural disasters and responding to military readiness contingencies (10:15). Two other key officer positions exist in the Operations Branch besides the Chief of Operations and those positions are the Chief of Resources and Requirements and the Chief of Readiness and Logistics.

The Chief of Resources and Requirements (DEMR) manages the Planning Section, Production Control Section and the Readiness and Logistics Section. The Production Control Section "Identifies, receives, processes and plans

work to be accomplished by the Base Civil Engineering organization [10:15]". The Production Control Section programs and manages the In-Service Work Plan, schedules the shops to accomplish the work and maintains the service call activities. The Planning Section performs detailed work descriptions, creates the bill of materials and prepares the cost estimate for the work that must be accomplished. The Material Control Section falls within the management scope of the Chief of Readiness and Logistics.

The third key officer position in the Operations Branch is the Chief of Readiness and Logistics (DEMRL). All materials for work accomplishment, parts for repairs and supplies for maintenance are acquired through the DEMRL Section. All vehicles used by the CE organization, including fire equipment, are assigned, transferred and authorized by DEMRL. Finally, the Chief of Readiness and Logistics is responsible for the overall readiness and training of the CE Primary Base Engineering Emergency Force (Prime BEEF) teams for base recovery and wartime mobility. If the three officer positions in the DEM Branch are filled with inexperienced CE officers or if the middle management major and captain positions in the Administration (DEA), Engineering and Environmental Planning (DEE), or Industrial Engineering (DEI) Branches are filled with inexperienced CE officers, the results could be the degradation of the base-level Civil Engineering organization.

Officer Shortage

The shortage of assigned major and captains to authorized positions and the overage of lieutenants implies that, with little experience, the lieutenants are filling important middle management positions. Strategic Air Command (SAC) and Air Force Logistics Command (AFLC) Civil Engineering

officer manning levels give indications of the shortage of middle management majors and captains and the overages of lieutenants. The number of Civil Engineering officers authorized by grade for the Strategic Air Command, compared to the number of CE officers assigned by grade, are shown in Table 2. Authorized majors and captains account for 43.3 percent of the total CE officer positions; however, only 26.5 percent of the authorized positions are filled with the required middle management personnel. SAC, as of October 1980, had 53.0 percent of its authorized majors and 66.0 percent of its authorized captains in the Civil Engineering officer force.

TABLE 2

SAC CIVIL ENGINEERING OFFICERS*

(AFSC 55XX)

| Grade | Auth | Asgn | % |
|---|---|---|---|
| Lt Col | 35 | 32 | 91 |
| Major | 47 | 25 | 53 |
| Captain | 82 | 54 | 66 |
| Lt | 134 | 152 | 113 |
| Total | 298 | 263 | 88 |

*As of October 1980

AFLC Civil Engineering officer authorizations and assignments by grade are shown in Table 3. AFLC has 64.8 percent of its total authorizations of Civil Engineering career field officers in the middle management major and captain positions. Only 36.8 percent of the authorized

positions are filled by assigned, middle management, majors or captains. While AFLC has 89.0 percent of its authorized majors assigned, only 27.0 percent of its authorized captains are assigned. AFLC has only eleven second and first lieutenants authorized, but over thirty lieutenants assigned. The 273 percent over assignment of lieutenants implies that the lieutenants are filling middle management Civil Engineering officer positions; especially at the captain level in AFLC. Figure 1 shows the declining trend of captains and majors, Air Force wide, in the Civil Engineering officer career field.

TABLE 3

AFLC CIVIL ENGINEERING OFFICERS*

(AFSC 55XX)

| Grade | Auth | Asgn | % |
|---|---|---|---|
| Colonel | 7 | 6 | 86 |
| Lt Col | 13 | 8 | 62 |
| Major | 9 | 8 | 89 |
| Captain | 48 | 13 | 27 |
| Lt | 11 | 30 | 273 |
| Total | 88 | 65 | 74 |

*As of May 1981

Assigned majors have declined from 93.0 percent of authorized positions in 1975 to a low of 79.0 percent in 1980 with a projection of 78.0 percent for May 1981. Assigned captains have also declined from 82.0 percent authorized positions filled in 1976 to 59.0 percent in 1980.

A projection of 56.0 percent of authorized positions filled is forcasted for May 1981 (9). With second and first lieutenants filling some of the authorized major and captain positions, the leadership and management of Civil Engineering (CE) organizations is probably reduced. Other areas of the CE organization are also likely to feel the impact of reduced middle management Civil Engineering officers such as Industrial Engineering analysis or construction inspection of contracted maintenance or repair projects.

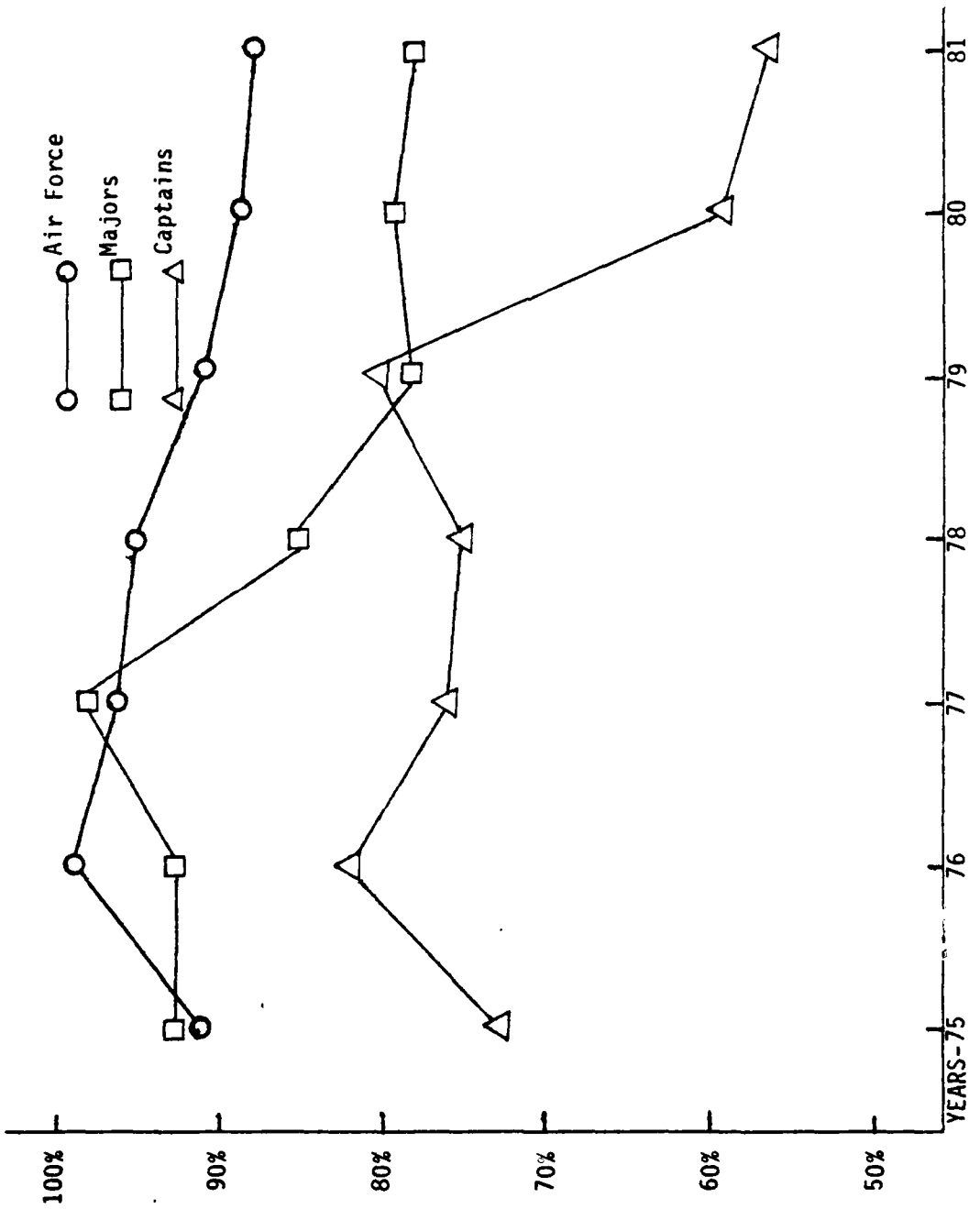



Fig. 1. AIR FORCE CIVIL ENGINEERING OFFICER MANNING (9)

## Problem Statement

The shortage of major and captain Civil Engineering career field officers is causing an adverse impact on the base-level Civil Engineering organization in important branches necessary to accomplish the support of the Air Force Base. The Administration, Engineering and Environmental Planning, Industrial Engineering, and Operations Branches of the base-level Civil Engineering organization have middle management major and captain positions where Civil Engineering experience and education are prerequisites to satisfactorily conducting everyday Civil Engineering activities. A major or captain who is the Chief of Industrial Engineering Branch is responsible for analyzing problem areas and recommending timesaving improvements. The Chief of Engineering and Environmental Planning Branch manages a large volume of expensive contract programs for the maintenance, repair and construction of Air Force property (12:1-3). A major or captain in the positions of Chief of Operations is responsible for the identification and accomplishment of work assigned to the Civil Engineering organization and a major or captain who is the Chief of Resources and Requirements is responsible for ordering materials and scheduling work requirements (12:1-4). If the ratio of assigned to authorized major and captain Civil Engineering career field officers continues to decline, the adverse impact in supporting the base mission will worsen. Officers of authorized rank are required by the base-level Civil Engineering organization to operate effectively, especially officers of the middle management, major and captain ranks.

## Justification

The current shortage of majors and captains in the middle management levels of the base-level Civil Engineering organizations is predicted to continue for the next few years according to the manning records of AFMPC (9). With the continued shortage, the impact on the base-level Civil Engineering (CE) organization should be analyzed to find the actual effects on the overall maintenance, repair and minor construction capabilities and the actual effects on the management of the organization. The results and findings of this thesis can be used by the Air Force Engineering and Services Center to provide guidelines and policies to base-level Civil Engineering organizations and Base Civil Engineers (BCE's).

## Major Assumptions

Several major assumptions about the population of Civil Engineering officers and the shortage of majors and captains were necessary for the conduct of this study. The first major assumption was that the shortage of majors and captains was equally distributed among all Continental United States (CONUS) Major Commands. Overseas Major Commands normally receive a higher percentage of majors and captains to fill the authorized positions (9). The second major assumption concerned the authorization of major and captain positions.

The study of the shortage of major and captain Civil Engineering officer positions assumed that the manning documents of all CONUS and Overseas Air Force Bases represented a true assessment of the required

manning levels. If a manning document position was listed as requiring a major or captain, then it was assumed that a major or captain, respectively, was needed to fill the position. The final major assumption was about Civil Engineering officers experience levels.

Experience level was assumed to increase proportionally with time spent in the Civil Engineering career field and with the higher grade of the officer. A second lieutenant was considered on the lower end of the officer experience level and a colonel was considered at the top experience level. General grade officers are not assigned to base-level Civil Engineering organizations and were therefore not considered in this research.

## Objectives

The two major objectives of this thesis were:

1. Determine the impact of the shortage of major and captain Civil Engineering officers on base-level Civil Engineering organizations.

2. Determine whether any single branch or area of responsibility of the base-level Civil Engineering organization was impacted more seriously than any other branch by the lack of authorized majors and captains.

The secondary objectives were to:

1. Determine the extent to which maintenance, repair and minor construction capabilities were lowered in the base-level Civil Engineering organization.

2. Determine if Engineering, Construction Management, or Industrial Engineering activities were affected by the shortage of authorized majors and captains.

3. Determine what officer levels and experience levels were filling authorized major and captain positions.

## Research Questions

1. To what extent is the numerical shortage of authorized major and captain officers, in the Civil Engineering career field, affecting the USAF base-level Civil Engineering organizations?

2. Where, in the base-level Civil Engineering organizations, is the shortage of authorized majors concentrated?

3. Where in the base-level Civil Engineering organization, is the shortage of authorized captains concentrated?

4. Is the shortage of authorized majors and captains having an impact on middle management decision making about base-level Civil Engineering activities?

5. Where is the shortage impacting the base-level Civil Engineering organization?

6. What key maintenance and repair management positions in the base-level Civil Engineering organization are affected by the shortage of authorized majors and captains?

7. How well are lieutenants performing in authorized major and captain positions?

# CHAPTER II

## METHODOLOGY

This chapter explains the methodology used to answer the research questions and to accomplish the research objectives stated in Chapter I. The data used to answer and evaluate the research questions was consolidated from the responses to the survey questionnaires returned by the Base Civil Engineers (BCEs) from the various U.S. Air Force Bases. The BCEs are personally responsible for the overall management of base-level Civil Engineering organizations. The research undertaken for this thesis was dependent on the opinions and perceptions of the BCEs, their understanding of the base-level Civil Engineering organization and the degree to which each BCE was affected by the shortage of majors and captains in his/her own organization. The BCE, as the chief executive officer in the base-level Civil Engineering organization, was in the best management position to indicate what middle management shortcomings, if any, were precipitated by the shortage of major and captain Civil Engineering officers.

### Population

The population under research consideration consisted of eighty-three Continental United States (CONUS) Air Force Bases and thirty-six overseas U.S. Air Force operating locations where base-level Civil Engineering organizations exist. In addition, San Antonio Real Property Maintenance Agency (SARPMA), which is the Civil Engineering organization management function for Brooks, Kelly, Lackland, and Randolph Air Force

Bases in Texas, was also sent a questionnaire. A complete list of CONUS Air Force Bases and overseas bases and operating locations, to which questionnaires were sent, is shown in Appendix B. Some bases have two base-level Civil Engineering organizations, the second organization is usually a Rapid Engineer Development, Heavy Operational Repair Squadron, Engineering (RED HORSE) Squadron. Kusan and Osan Korea are just two examples of bases with two base-level Civil Engineering organizations.

## Sampling Plan

The identical survey instrument was sent to each base-level Civil Engineering organization in the population to determine the perceptions and opinions of the Base Civil Engineer (BCE). A return rate of 50 percent of the survey questionnares, used to gather the data, was anticipated because of the problems associated with low or marginal major and captain officer manning. At least thirty-five of the survey questionnaires were required as a minimum number to be returned in order for the research effort to be valid. Returned survey questionnaires considered incomplete were discarded without use of any data contained in the rejected questionnaire.

The survey instruments for overseas Air Force operating locations were identical to the instruments used for CONUS Air Force Bases but were marked with a highlighted felt pen on the last page of the questionnaire. The mark was to distinguish the two demographic locations for return rates and the possible differences in responses to the survey instrument.

## Survey Instrument

The survey instrument contained thirty-nine questions which were designed to identify where the shortage of majors and captains are significant in the base-level Civil Engineering organizations. The BCE is in the top management position to evaluate where the shortage is affecting the organization as perceived by higher level base-level management. The opinions and other responses from the BCEs perceptions reflected which branches of the base-level Civil Engineering organization were more importantly manned by experienced major and captain officers. Since the BCE is an important base-level officer, the survey questionnaire was designed to be answered in the least time consuming manner.

The survey questionnaire was designed so that the Base Civil Engineers could answer the questions directly on the instrument itself rather than fill out an accompanying computer scan sheet. It was felt that a greater response rate would be realized if the BCEs only had to pick up a pencil, mark the questionnaire, and place the questionnaire in the return envelope provided. The survey questionnaires returned were computer coded in the format necessary to interpret the data.

The survey questionnaire consisted of thirty-nine questions printed on eight pages of 8½ by 11 inch paper. A cover letter, signed by the Dean of the School of Systems and Logistics, a privacy act statement, and a preaddressed return envelope accompanied the survey questionnaire. The questions and the survey instrument were approved by Headquarters, Air Force Manpower and Personnel Center, Randolph AFB, Texas

and assigned USAF Survey Control Number 81-40. The control number expires 30 June 1981. The survey questions concentrated on the approval authorities of Civil Engineering managers and positions of weakness in the base-level Civil Engineering organization.

Questions concerning the relative project approval authorities of the Base Civil Engineer, the Chief of Operations and the Chief of Resources and Requirements were used to indicate the amount of responsibility transferred down to the middle management levels. If the BCE delegated most of his approval authority to the Chief of Operations or Chief of Resources and Requirements, it indicated the amount of trust the BCE had in the ability of middle management to make decisions. If, however, the BCE retained the majority of the approval authority, it tended to indicate less trust in the judgement of middle management or possibly the lack of qualified middle management personnel.

The survey questions pertaining to the quantity of authorized major and captain Civil Engineering career field officers against the quantity of assigned officers indicated where, in the base-level Civil Engineering organization, the shortage was most severe according to the BCE. As an example, the shortage of majors could have been more severe in the Operations Branch (DEM) while the shortage of captains could have been more severe in the Engineering and Environmental Planning Branch (DEE).

Open-ended questions Q.36 through Q.39 allowed for the expression of personal concerns by the Base Civil Engineers. What major and captain positions are the least important or most important to the BCE, were expressed in the answers to the four questions. An analysis of the data

contained in the answers to the questions were categorized. The frequencies of each category were presented and the means of the responses reported. The responses to the ADDITIONAL COMMENTS section of the survey questionnaire are presented in Appendix C.

Half of the final page of the survey questionnaire was reserved for any additional comments that the BCEs wished to express. The additional comments received pointed out deficiencies contained in the survey questionnaire, presented viewpoints about the shortage of major and captain CE officers and provided a source of future research topics. The final page of the survey questionnaire also contained a section to request the consolidated results of the survey.

Any Base Civil Engineer (BCE) who had interest in the results of the survey was offered an opportunity to receive the consolidated results. An optional section was provided to fill in the organization, base, and zip code. The results of the survey will be mailed after they are tabulated. The majority of the tabulated results will be in descriptive statistics format.

## Descriptive Statistics

The statistics reported in this thesis for the data analyzed were descriptive statistics. The mean, standard deviation, variances, and other reported statistical information was descriptive because no previous standards had been established for the impact on the shortage of major and captain Civil Engineering officers. Approval authority for maintenance, repair, and minor construction projects is delegated by the parent Major Command and could vary from one Major Command to another. U.S. Air Force Major Commands have appropriated funds project approval levels of $500,000.00 for

maintenance, $400,000.00 for repair and $100,000.00 for minor construction projects (11:2-8). "Major commanders may specifically delegate all or part of their approval authority in writing to intermediate commanders [11:2-4]". The Base Civil Engineer could and has delegated his/her approval authority to members of the organization as necessary to accomplish major Civil Engineering activities (11:2-4).

The statistics reported for the answers to questions about the shortage of major and captain Civil Engineering officers were also descriptive. No research effort or study could be located that dealt with the effects of the officer shortage in the Civil Engineering career field. Studies have been performed by others on why lieutenants entering the Civil Engineering career field decide to leave the Air Force at the four year point (1). A study by Major James W. Gibson also researched the possibility of utilizing other than engineering graduates with bachelor of science degrees as possible candidates for entrance into the Civil Engineering career field (3). No research could be found concerning the loss of middle management major and captain Civil Engineering officers or the effects on the positions occupied by these officers. One of the problems compounding the impact of the shortage of major and captain Civil Engineering career field officers was the 1978 revision of Air Force Regulation 85-1 (12).

The revised regulation, covering the resources and work force management of Civil Engineering personnel, created two new officer positions in the Operations Branch and deleted one officer position in the now defunct Programs Branch. The new officer positions created by the regulation revision were the Chief of Resources and Requirements (DEMR) and

the Chief of Readiness and Logistics (DEMRL). The position of Chief of Resources and Requirements almost exactly replaced the duties of the defunct Chief of Programs (10:4). The position of Chief of Resources and Requirements has the authority to approve and disapprove work requested of the Civil Engineering organization and is thereby responsible for obligating public funds. The Chief of Readiness and Logistics has responsibility for training wartime forces and ordering materials to keep the Operations work force at full productive capacity (10:3).

No standards have been set for majors and captains in the overall base-level Civil Engineering organization because the size of the base-level organization varies from base to base and among Major Commands. SAC, for example, has an operational mission that requires the Civil Engineering organization to remain at the base during wartime conditions while a TAC Civil Engineering organization is required to be a mobile force for wartime missions. Because there are no set standards among Major Commands, the impact of the shortage of major and captain Civil Engineering officers was obtained from BCEs.

## Data Collection Plan

The primary source of data was the response of the CONUS and overseas Base Civil Engineers (BCEs) to the questions on the survey instrument. The secondary source of data consisted of a thorough literature review of the documents which related to the shortage of major and captain CE officers. The reasons for low retention rates, increased management requirements on majors and captains and the possible changing of regulations to allow more

entrants into the officer career field are a few of the documents that were relevant to this research. The primary data was then consolidated using the Statistical Package for Social Sciences (SPSS).

The responses received from the BCEs were coded into AFIT's Control Data Corporation (CDC) Computer and run through the SPSS standard computer program. Descriptive statistics including histograms, means, variances and standard deviations were obtained and analyzed to accomplish the research objectives. Demographic data was also obtained to determine the background of the BCEs.

Military rank, total active military service time, years in the Civil Engineering career field, Civil Engineering school attendance, and the size of the BCEs' officer staff were the extent of the demographic data obtained. The data were used to establish means, frequencies, and variations of the population.

## Research Method

The survey instrument was designed to answer the seven research questions stated in Chapter I. Four of the research questions (numbers one, four, six and seven) were directly related to the main objective of determining the impact of the major and captain shortage. The remaining three research questions (numbers two, three and five) were designed to answer the second main objective: determine whether any single branch of the base-level Civil Engineering organization was impacted more seriously by the shortage.

## Data Analyses

Three types of questions were used in the survey instrument sent to the BCEs to gather data for analyses: Likert-Scale questions, location-determination question, and open-ended questions. Each type of question was interpreted using a different statistical technique to acquire data for analysis. The location of the mean was used for Likert-Scale questions.

### Likert-Scale Measurement Questions

The criteria for locating the mean and interpreting the corresponding results of Likert-Scale questions are as follows.

1. If the mean response fell between 1.0 and 1.5, then the conclusion was drawn that the BCEs "strongly agree" with the question statement.

2. If the mean response was greater than 1.5, but less than or equal to 2.5, then the conclusion was drawn that BCEs "agree" with the question statement.

3. If the mean response was greater than 2.5, but less than or equal to 3.5, then the conclusion was drawn that the BCEs were "undecided" about the question statement. However, if the mean response was less than 2.75, it was concluded that the BCEs "tended to agree" with the question statement. Likewise, if the mean response was greater than 3.25, then it was concluded that the BCEs "tended to disagree" with the question statement.

4. If the mean response was greater than 3.5, but less than or equal to 4.5, then the conclusion was drawn that the BCEs "disagreed" with the question statement.

5. If the mean response fell between 4.5 and 5, the conclusion was drawn that the BCEs "strongly disagreed" with the question statement.

The overall mean of the responding BCEs was accepted as the combined groups answer or perception about the corresponding question statement.

Location-Determination Questions

Questions used to find out what branches in the base-level are impacted by the shortage of majors and captains and what approval authority different positions have are location-determination type questions. The data from the location-determination type questions was analyzed using the mode. For each question, the mode of the BCEs responses was used as the combined population perception or answer to the question statement. In cases where other frequencies of responses were within 10 percent of the mode, or the responses produced multimodal results, all significant perceptions were recorded. The final type of question used in the survey instrument was the open-ended type question.

Open-Ended Questions

Responses from the BCEs to open-ended type questions was analyzed similar to the method used for location-determination type questions. The responses were reviewed and list of tentative categories were established.

After the cutoff date for returned surveys was reached, the categories were finalized and the BCE responses were reviewed and placed into one of the categories. The modes and frequencies were then analyzed in the same manner as location-determination type questions.

# CHAPTER III

## LITERATURE REVIEW

The shortage of major and captain Civil Engineering career field officers is included in an overall shortage of military personnel for all of the U.S. Armed Services. The general shortage of military personnel has become a matter of public concern as noted in the 27 October 1980 issue of Newsweek. In the article titled, "Is America Strong Enough?," a statement was made that the Air Force was short of its desired pilot manning level by thirteen hundred persons. Seven out of ten voting Americans feel that the country is not keeping up with the Soviets in the military power race yet less than half of the voting public would like the Draft reinstated in the pre-Korean War format (5:48). The reasons for military personnel leaving the service is also public knowledge if the Newsweek article is any indication.

According to the Newsweek article, the huge exodus of experienced commissioned and noncommissioned officers is prompted by low pay and long overseas tours (5:50). The military manpower drain in the experienced range of from six to eight years of military service increased 20 percent between the years 1975 and 1979. "Even the glamorous Air Force is having trouble retaining pilots, computer specialists, and other skilled men and women who are leaving for jobs in the private sector [5:52]." Captains with six to eight years of military service in the Civil Engineering career field are the middle management personnel under study in this research effort.

Newsweek states that money is the main reason people are leaving the military service.

> Money is the root of the manpower problem in all three services. Adjusted for inflation, the income of armed-services personnel has dropped up to 20 percent since 1972, making 10,000 Air Force families eligible for food stamps. A 1979 Pentagon study estimated that it would take $5.5 billion in pay hikes and benefit improvements just to restore the military-to-civilian pay ratio that existed in 1971-before the draft was abandoned. The discrepancy was worse where it hurt the most: in the 25-to-35 year old group that contains precisely the trained personnel the services need most desperately to retain [5:52].

If the military would pay and maintain the competitive policies of commercial companies and corporations they would keep and attract the top technicians (and engineers) needed in the military service (5:55). Besides pay, other variables impact on low retention of major and captain Civil Engineering officers in the Air Force, such as promotion opportunities and job responsibilities.

## Low Retention of Junior Officers

In order not to perpetuate the shortage of Civil Engineering majors and captains, junior officers must be retained so that sufficient promotions to those ranks are possible. Two of the objectives of a study by Blackburn and Johnson, on low retention of junior officers, were: (1) to determine the relationship between retention determinants and job satisfaction, and (2) to determine the relationship between retention determinants and expressed career intent. The retention determinants for the study were age, tenure, pay, promotion, peer group integration, role clarity, job autonomy and responsibility, task repetitiveness, supervisory style, and similarity of job and interests (1:3). The relationship between the retention determinants and job satisfaction was found to be statistically significant for four of the six determinants tested.

Pay and promotion as determinants of job satisfaction were not statistically supported by the data and they were not found to be significant determinants of retention of junior officers (1:67). The researchers, however, felt that promotion was a significant factor and that an inverse relationship between promotion and turnover existed (1:74). The researchers also speculated that Maslow's Hierarchy of Needs Theory helped to decrease the statistical significance of the pay data. "Thus, if pay is considered adequate to satisfy the need for survival and security, the failure of the data to support hypothesis 1 may be considered consistent with Maslow's Theory [1:78]." The second objective was to determine the relationship between retention determinants and expressed career intent.

Regression analysis results did not show a statistically significant relationship between the retention determinants and expressed career intent (1:69). The retention determinants were not ruled out as indicators of expressed career intent. The final results of the thesis inferred the dependence of retention of junior officers on the ten major determinants.

The authors conclude that age, tenure, pay, promotion, peer group integration, role clarity, job automony and responsibility, task repetitiveness supervisory style, and similarity of job interests are determinants of job satisfaction and expressed career intent. Supervisors and leaders of Civil Engineering officers should be informed of this information. Major Willis K. Whichard, Jr., in an Air Command and Staff College Research Study, found similar results amongst Civil Engineering junior officers in May, 1974.

## Low Retention of Junior Civil Engineering Officers

Whichard's research study concentrated on the shortage of Civil Engineering officers, AFSC 55XX, and the problems associated with the low retention rate of junior officers in the 1973 through the 1974 time frame. Junior officers for his study were officers in the rank of second and first lieutenants and captains with less than six years of total active federal commissioned service. The population under consideration was the junior officer Civil Engineering career field and the sample space consisted of the junior officers of Air Training Command (ATC) (13:5). The research extrapolated the data obtained from ATC Civil Engineering junior officers to the problem of low retention of junior Civil Engineering officers Air Force wide. Whichard stated two major objectives of his research.

The first objective of the research was to ascertain whether the retention rate of CE officers met the mission requirements of the Air Force. The second objective, which was very difficult to ascertain because the researcher hid the objective in his writing, was to determine what cost are incurred and what cost are associated with the replacement of a junior officer in the Civil Engineering career field (13:6). The results of the research were summarized in Chapter IV of Whichard's research study.

The summary of Whichard's study on the utilization of Civil Engineering junior officers states that the low retention rate problem is self-perpetuating. He stated the following:

> A careful review of this Chapter (IV) will show the reader that the problems presented here are self-perpetuating. As the officers in one year group become dissatisfied and resign from the (military) service, the officers in the following year groups are forced to move out of positions. Thus that second group becomes dissatisfied and the bulk of the group separates. The result is a vicious circle wherein low retention rates create low retention [13:38].

The problem of low retention of junior officers in the Civil Engineering career field impacts the shortage of major and captain Civil Engineering officers. Lower manning levels at the lieutenant ranks implies less promotions to captain and less promotions from captain to major.

In Chapter V of Whichard's study, three Base Civil Engineering Officers were interviewed and stated that the average junior CE officer had very little practical engineering or management experience (13:43). (The authors of this thesis question the above statement because Whichard assumed that junior officers were officers with less than six years of commissioned time and yet the Base Civil Engineers were quoted as saying that the average junior officer had no practical experience). The study does point out that once a junior officer does gain a small amount of experience he or she is moved into a management position. Thus, as Whichard states, "The most outstanding officer would be moved out of the engineering job at precisely the time he had gained the experience to begin to take on the large engineering projects [13:45]." Chapter VI expressed more views of the three Base Civil Engineering officers interviewed.

The BCEs felt that the problems associated with low junior officer retention are varied and cannot be specifically identified. The three BCEs felt that job satisfaction caused low retention but no analyses were performed on the data. The BCEs also held the opinion that job satisfaction

was a requirement for retaining junior officers but not one of the BCEs could offer a proposal as to how retention of junior officers could be improved. Major Thompson's research report, for Air Command and Staff College, showed a relationship between Management and Supervision of Scientist and Engineers and the retention rate of the same.

## Supervision-Management vs Low Retention

The research study of Richard L. Thompson identified factors that may affect the career intentions of major and captain Civil Engineering officers, as well as other engineering officers, as determined by the relationship with their immediate supervisors or managers. The major objectives of the study were to identify the major management and supervisory factors that affect career intentions of Scientist and Engineering officers, determine the effects of management and supervision on the retention rate, and provide data to the Leadership and Management Development Center (LMDC) to use in their consulting activities. The problem of Thompson's research study relates to the problem of this thesis: "The Air Force has a scientist and engineer retention problem [8:3]."

The conclusions of the Thompson study provided three significant observations. The first observation was that the quality of management and supervision received by scientist and engineers was directly related to the retention rate of these officers. The second observation verified that scientist and engineering officers received more positive feedback than other type officers in the Air Force. (This is possibly conjecture on the part of Thompson. The authors speculate that his data does not support the hypothesis that scientist and engineers receive more feedback

than any other type line officers). The third and final conclusion of Thompson's research study was that supervision and management were major factors in the decisions of scientist and engineers to leave the military service. The three major results of the research study lead Thompson to conclude with one major recommendation: Supervisors should be made aware of their influence on the retention of scientific and engineering officers.

# CHAPTER IV

## RESEARCH ANALYSIS

The purpose of this chapter is to analyze the data obtained from the Shortage of CE Major and Captain Impact Questionnaire and report the results. Only significant results which answered or failed to answer the seven research questions are reported. Survey questions were developed for each research question. The specific survey question numbers pertaining to each research question are listed in the section analysis for each research question. The entire descriptive statistics for the research effort are available in Appendix I. Ninety-nine Base Civil Engineers returned survey questionnaires, but only ninety-one returns were valid for this research effort.

### Demographic Information

The demographic data obtained from the respondents was limited to the six areas of: (1) military rank, (2) total years of military service, (3) years served in the Civil Engineering career field, (4) attendance at the Base Civil Engineering Staff Officers Course, (5) number of commissioned officers authorized in each organization, and (6) CONUS or overseas locations. The demographic data was used to establish the experience levels of the Base Civil Engineers responding to the questionnaire. The complete histograms, modes, and means of the respondents, to the demographic survey questions

Q.1 through Q.5, is attached in Appendix I. Significant highlights of the demographic survey questions start with military rank.

The average respondent to the survey questionnaire was a colonel or lieutenant colonel in military rank with eighteen years in the military service. The average Base Civil Engineer was in the Civil Engineering career field for ten years with the majority (mode) in the career field over fifteen years. Finally, the majority (25 percent) of the Base Civil Engineers had attended the BCE Staff Officers Course offered by the Air Force Institute of Technology and were in charge of base-level Civil Engineering organizations having an average of 13.7 officers and a mode of ten to fifteen commissioned officers. Of the ninety-one respondents, sixty-five of the Base Civil Engineers responded from CONUS Air Force Bases and twenty-six from overseas operating locations. The first of seven research questions were developed to determine if the shortage of majors and captains was adversely affecting the Base Civil Engineering Organizations.

## Research Question One

> To what extent is the numerical shortage of authorized major and captain officers, in the Civil Engineering career field, affecting the USAF base-level Civil Engineering organization?

Survey questions Q.6, Q.7, Q.8, Q.9, Q.10, Q.11, and Q.12 were used to answer research question number one. Survey questions Q.6 through Q.8 pertained to the number of authorized captain positions and the number of assigned officers of captain rank or lower filling those authorized positions. Survey questions Q.9 through Q.12 were used to determine the number of authorized major positions in the base-level Civil Engineering

organization as compared to the number of majors and lower ranking officers assigned to those authorized major positions. The answer to research question one was used to determine how seriously the numerical shortage of authorized majors and captains was affecting the base-level Civil Engineering organization.

Effects of Captain Shortage

Survey question Q.6 asked the Base Civil Engineers (BCEs) the number of authorized captain positions in the base-level CE organization. The mean response was 4.7 captain positions authorized with a trimodal frequency distribution of three, four, and five captain authorizations. Survey questions Q.7 and Q.8 were used to determine how the authorized captain positions were filled with personnel.

The results of the responses to survey question Q.7 showed that a mean of 1.5 captains were filling the mean of 4.7 authorized captain positions. To summarize, 32 percent of the authorized captain positions were filled by assigned captains. Survey question Q.8 responses showed that a mean of 2.7 authorized captain positions were filled by lower ranking officers or were not filled at all. The mode of twenty-one responses to survey question Q.8 showed that three authorized captain positions were filled by lower ranking personnel. The responses to survey questions concerning major authorizations in the base-level CE organizations provided similar results.

TABLE 4

SURVEY QUESTIONS Q.6, Q.7, AND Q.8

| | MEAN | MODE |
|---|---|---|
| Authorized Captain Positions | 4.77 | 3,4,5 |
| Authorized Captain Positions Filled By Captains | 1.55 | 1 |
| Authorized Captain Positions Filled Below Rank of Captain | 2.70 | 3 |

Effects of Major Shortage

The responses received to survey question Q.9 showed that the base-level Civil Engineering organization had a mean of 1.3 major authorizations with 54 percent of the respondents stating that they had only one major authorization. However, responses to survey questions Q.10 and Q.11 showed a mean of 0.64 authorized major positions filled by majors and a mean of 0.71 authorized major positions filled with lower ranking personnel, respectively. Thirteen percent of the respondents stated that they had lieutenants filling authorized major positions. Civil Engineering majors assigned to authorized major positions at base-level organizations enjoyed a higher percentage of fills, 47 percent, as compared to only 32 percent for captains.

## Research Question Two

Where, in the base-level Civil Engineering organization, is the shortage of authorized majors concentrated?

TABLE 5

SURVEY QUESTIONS Q.9, Q.10, Q.11, AND Q.12

| | MEAN | MODE |
|---|---|---|
| Authorized Major Positions | 1.35 | 1.0 |
| Authorized Major Positions Filled By Majors | 0.64 | 0 |
| Authorized Major Positions Filled Below Rank of Major | 0.71 | 0.1 |
| Authorized Major Positions Filled By Lieutenants | 0.13 | 0 |

Survey questions Q.13, Q.14, Q.38, and Q.39 were developed to obtain from the BCEs, their perception of where the shortage of majors in the base-level Civil Engineering organization was concentrated. Survey questions Q.13 and Q.14 asked what branch of the organization was impacted the greatest and which branch was impacted the least by the shortage of majors. Forty-five percent of the respondents perceived that the shortage of majors had the greatest impact in the Operations Branch. In the answers to open-ended question Q.39, the respondents reinforced the perception that the Operations Branch was impacted the greatest. Thirty-seven percent of the BCEs felt that the Chief of Operations was the most

important major position in the base-level CE organization. Thirty-five percent of the BCEs, responding to survey question Q.39, stated that all of the major positions in their organizations were important or that they had only one major position authorized. The consensus of the BCEs responding felt that the Chief of Operations was the most important authorized major position and that the Operations Branch was impacted most severely by the shortage of authorized majors.

Survey questions Q.14 and open-ended question Q.38 were developed to determine what base-level CE branch was impacted the least by the major shortage and what major position was considered the least important. Thirty-seven percent of the respondents, answering survey question Q.14, replied that the Administration Branch (DEA) was the branch impacted the least by the shortage of majors. Twenty-eight percent of the respondents to survey question Q.14 felt that any and all authorized major positions in any branch were important: None were any less important. The perception that all base-level CE major positions were important was strongly reinforced by the responses to open-ended survey question Q.38. Seventy-one percent of the BCEs, returning the survey questionnaire, stated that no authorized major position was considered least important in their organizations. The Chief of Resources and Requirements was considered the second least important authorized major position and received 12 percent of the responses. The position was of lesser importance only because the BCEs had a strong captain or lieutenant filling the position.

## Research Question Three

Where, in the base-level Civil Engineering organization, is the shortage of captains concentrated?

Survey questions Q.15, Q.16, Q.36, and Q.37 were developed to obtain, from the Base Civil Engineers (BCEs), their perceptions on where the shortage of authorized captains was concentrated in their organizations. According to the responses received for survey question Q.15, 59 percent of those BCEs, returning the survey questionnaire, felt that the Engineering and Environmental Planning Branch, DEE, was impacted the greatest by the shortage of authorized Civil Engineering captains. The Operations Branch, DEM, received the next highest response, with 20 percent of the BCEs stating that the branch was impacted the greatest by the shortage of authorized captains. Responses to open-ended survey question Q.37 helped to clarify the exact positions in the Engineering and Environmental Planning Branch and the Operations Branch which the BCEs felt were the most important authorized captain positions. The results are shown in Table 6. Approximately 30 percent of the responses stated captain positions in Engineering and Environmental Planning Branch were very important and 41.8 percent stated captain positions in the Operations Branch were very important. It was the concensus of the BCEs that the Administration and Industrial Engineering Branches were impacted the least by the shortage of captains.

TABLE 6

SURVEY QUESTION Q.37

| | NO. | % | NO. | % |
|---|---|---|---|---|
| DEE-------7 | 7 | 7.7 | | |
| DEEC-------7 | 7 | 7.7 | | |
| DEEE----------10 | 10 | 11.0 | | |
| DEEV---3 | 3 | 3.3 | | |
| DEE SUBTOTAL | 27 | 29.7 | 27 | 29.7 |
| DEM---3 | 3 | 3.3 | | |
| DEMR----------21 | 21 | 23.1 | | |
| DEMRL----------14 | 14 | 15.4 | | |
| DEM SUBTOTAL | 38 | 41.8 | 38 | 41.8 |
| OTHER----------26 | 26 | 28.5 | 26 | 28.5 |
| TOTAL | | | 91 | 100.0 |

Survey question Q.16 and open-ended question Q.36 were developed to ascertain which Civil Engineering branch was impacted the least by the shortage of authorized captains and what captain positions were perceived to be the least important by the base-level BCEs. Thirty-eight percent of the respondents replied that the Administration Branch, DEA, was least

impacted by the shortage of captains. Second in the list of branches least impacted was the Industrial Engineering Branch, DEI, with 20 percent of the responses. Despite the BCEs' views on the least important base-level branches, their responses to survey question Q.36 about what authorized captain position was of lesser importance, did not agree with the corresponding question about the least important branch.

After categorizing the responses to open-ended survey question Q.36 and consolidating the results, 36 percent stated that the Engineering and Environmental Planning Branch contains the authorized captain positions considered of lesser importance to Base Civil Engineers (BCEs). Thirty-three percent of the BCEs replied that all of their authorized captain positions were considered important: None were of any lesser importance. The responses to survey question Q.36 did not substantiate the responses to survey question Q.16.

## Research Question Four

> Is the shortage of authorized majors and captains having an impact on middle management decision making about base-level Civil Engineering activities?

Survey questions Q.19, Q.20, Q.21, and Q.25 were developed to determine how much approval authority for maintenance, repair, and minor construction work performed by base-level Civil Engineering, was delegated to middle management positions. The middle management position with the highest visability, and normally a captain or major authorized position, was the Chief of Resources and Requirements, DEMR, in the Operations Branch. Approval authority is delegated down the chain-of-command from the major command level. At the major command, approval authority limits are

$500,000.00 for maintenance type work, $400,000.00 for repair type work, and $100,000.00 for minor construction type work (11:2-8). Any amount of approval authority up to the above limits can be delegated to base-level Civil Engineering organizations (11:2-4).

Responses of the BCEs to the survey questionnaire showed that the mean maintenance approval authority, delegated to the Chief of Resources and Requirements, was $77,000.00. However, the mode of responses to survey question Q.19 was that 75 percent of the maintenance approval authority of the Chiefs of Resources and Requirements was less than $50,000.00. The approval authority for repair type work was similar to the approval authority for maintenance type work.

The responses to survey question Q.20 showed a mode of 84 percent stating that the repair approval authority of the Chief of Resources and Requirements was $50,000.00 or less. The mean of the responses placed the repair approval authority of the Chief of Resources and Requirements at $68,000.00. The repair approval authority was $11,000.00 below the mean for maintenance approval authority for the Chiefs of Resources and Requirements. However, the mean for minor construction approval authority was only $7,700.00 which was much lower than the approval authority for maintenance or repair.

Survey question Q.21 was used to determine the mean minor construction approval authority of the Chief of Resources and Requirements and Q.25 to determine that of the Chief of Operations. Fifty-eight percent of the BCEs responding, stated that $5,000.00 or less of approval authority was delegated to the Chief of Resources and Requirements. The

responses to survey question Q.25 showed that the mean approval authority for the Chief of Operations was $12,475.00 or almost $5,000.00 more than that of the Chief of Resources and Requirements. In addition, the mode of responses to survey question Q.25, concerning Chief of Operations' approval authority, 37 percent, indicated $5,000.00 or less in approval authority was delegated to the Chief of Operations. The secondary mode was approval authority between $5,000.00 and $10,000.00 with eighteen responses or 19 percent of the responses.

The BCEs were delegating approval authority down to middle management major and captain authorized positions. That the position of Chief of Operations had more minor construction approval authority than the Chief of Resources and Requirements is illustrated by comparing the responses to survey questions Q.21 and Q.25.

## Research Question Five

Where is the shortage impacting the base-level Civil Engineering organizations?

To determine, from the perceptions of the BCEs, where the shortage of majors and captains was impacting the base-level Civil Engineering organizations, survey questions Q.26 to Q.30, Q.32, Q.34, and Q.35 were utilized. Survey question Q.26, concerning the next lower ranking officer, was crosstabbed against demographic survey question Q.1. The results are shown in Table 7. Sixty-one percent of the colonels had lieutenant colonels as officers who could have acted in their stead. Majors and captains seem to have had a higher percentage of majors and captains as secondary military

officers in charge with percentages of 37 percent and 100 percent respectively. Survey questions Q.27, Q.28, and Q.29 were used to determine the maintenance, repair and minor construction approval authorities of the Base Civil Engineers (BCEs).

TABLE 7

BCE RANK (Q.1) VS NEXT RANKING OFFICER (Q.26)

| BCE RANK (Q.1) \ NEXT LOWER RANKING OFFICER (Q.26) | Lt Col | Maj | Capt | 1Lt | 2Lt | UNK |
|---|---|---|---|---|---|---|
| Col | 27 | 13 | 2 | | 2 | |
| Lt Col | 2 | 27 | 5 | | 1 | 1 |
| Maj | | 3 | 4 | 1 | | |
| Capt | | | 3 | | | |

The results of survey question Q.27 showed that the mean of the BCEs had $195,600.00 in maintenance approval authority. The majority of the responses, the mode of 52 percent, stated that they had $100,000.00 or less in maintenance approval authority. Compared with the mean of $77,000.00 in maintenance approval authority for the Chief of Resources and Requirements, the BCEs have delegated only 40 percent of their maintenance approval authority down to middle management positions.

The mean of the responses to survey question Q.28, about the repair approval authority of the BCEs, was $104,000.00 with 45 percent of the respondents, the mode, stating that they had repair approval authority of

$50,000.00 or less. When compared with the Chiefs of Resources and Requirements mean repair approval authority of $68,000.00, the BCEs have delegated over 65 percent of their repair approval authority down the chain of command to middle management positions.

The minor construction approval authority of the BCEs was almost $5,000.00 above the mean for the Chief of Operations according to the results of survey questions Q.25 and Q.29. When survey questions Q.29 and Q.21 are compared, the BCEs had about $10,000.00 more minor construction approval authority than the Chief of Resources and Requirements. The tight control on the minor construction approval authority was partially explained by U.S. Air Force Regulations which prohibit more than five percent of the total productive work force manhours being utilized for minor construction type work per fiscal year (11:5-3). BCEs tend to withhold 30 to 60 percent of their approval authorities rather than allow middle managers to make the funding decisions. When asked specific questions about the Industrial Engineering Branch, the quality of Engineering and Environmental Planning Branch activities or the amount of decisions that they, the BCEs, were required to make, the answers tended toward indecision.

Impact on Industrial Engineering

Survey question Q.30 was a Likert-Scale question which was used to ascertain the impact of the shortage of major and captain Civil Engineering officers on the Industrial Engineering Branch (DEI). The respondents were undecided as to whether the Industrial Engineering Branch was impacted or unaffected by the shortage of majors and captains. The mean response to survey question Q.30 was 2.912 which was in the response region for Likert-

scaled questions classified as "undecided". The bimodal responses for "agree" and "disagree" with the question statement were 24.2 percent for each. The answer to survey question Q.32, about BCE decision making, was in the "agree" region.

Increased Decision Making By BCEs

Survey question Q.32 was also a Likert-scale question and was developed to determine whether the number and types of decisions made by the BCEs had increased due to the shortage of authorized major and captain CE officers. The majority of the responses received "agreed" that the number and types of decisions, made by BCEs, had increased due to the shortage of majors and captains. Thirty-six percent of the respondents "agreed" with the survey question statement. The secondary mode was 27 percent who "strongly agreed" with the survey question statement of increased BCE decision making due to the shortage of major and captain CE officers. The mean of responses to the Likert-scale survey question was 2.418 which indicated that the BCEs agreed with the statement of survey question Q.32. While the BCEs agreed that an increase in their own decision making existed, they were undecided as to whether or not the quality of engineering projects, produced by the Engineering and Environmental Planning Branch, had decreased or increased because of the shortage of major and captain CE officers.

Quality of Engineering Branch Projects

Survey question Q.35 asked the BCEs if the quality of engineer designed projects, produced by the Engineering Branch, had decreased due to the shortage of authorized CE majors and/or captains. The results of

the Likert-scale question produced an opinion of "undecided" from the BCEs. The mean of the replies was 2.912, the same as survey question Q.30 about the activities of the Industrial Engineering Branch. The mode of 32 percent of the responses to the survey question "disagreed" with the question statement. The secondary mode was "agree" with the question statement accumulating 30 percent of the replies. With a firm "undecided" on the perceptions of the BCEs to the Engineering Branch survey question, the quality of projects might or might not have changed with the shortage of majors and captains. The BCEs did have a perception on the levels of maintenance, repair, and minor construction at their bases.

Levels of Maintenance, Repair, and Construction

The mean, 3.6 of the responses, "disagreed" with the statement of survey question Q.34. The Likert-scale statement was: The level of maintenance, repair, and minor construction at my base has decreased because of the lack of qualified Civil Engineering majors and captains. The mode of the responses was 43 percent who "disagreed" with the statement and the secondary mode was 23 percent who "strongly disagreed" with the statement. The levels of maintenance, repair, and minor construction type work was perceived by the BCEs not to have decreased because of the lack of majors and captains.

## Research Question Six

**What key maintenance and repair management positions in the base-level Civil Engineering organization are affected by the shortage of authorized majors and captains?**

The Operations Branch has the majority of the responsibility for the maintenance and repair of real property on a U.S. Air Force base (10:15). The key maintenance and repair officer positions in the Operations Branch are the Chief of Operations and the Chief of Resources and Requirements. The BCEs were therefore asked survey questions Q.17, Q.18, Q.22, Q.23, and Q.24 to determine if the key management positions in the Operations Branch were affected by the shortage of majors and captains. Survey questions Q.17 and Q.22 were used to ascertain how many majors and captains were authorized as Chief of Operations and Chief of Resources and Requirements respectively. Survey questions Q.18 and Q.23 were used to find out how many majors or captains were assigned to those positions.

Chief of Resources and Requirements

The responses to survey question Q.17 showed thirty-four captains and forty majors were authorized positions as Chief of Resources and Requirements. The results of survey question Q.18 showed that fifty-one captains and nine majors were assigned to the seventy-four authorized captain and major positions. Captains and majors accounted for 81 percent of the authorized Chief of Resources and Requirements positions, but only 61 percent of the positions were filled by captains or majors. See Table 8 for the comparison of authorized versus assigned rank for the Chief of Resources and Requirements.

TABLE 8

AUTHORIZED (Q.17) VS ASSIGNED (Q.18) RANK OF DEMR

| AUTHORIZED RANK CHIEF OF RR (Q.17) | ASSIGNED RANK CHIEF OF RR (Q.18) | | | | | | |
|---|---|---|---|---|---|---|---|
| | Maj | Capt | 1Lt | 2Lt | NCO | CIV | OTHER |
| Maj | 7 | 23 | 4 | 3 | 2 | 1 | |
| Capt | 2 | 27 | 3 | 2 | | | |
| 1Lt | | | | 2 | | | |
| NCO | | | | | 4 | | |
| CIV | | | | | | 8 | |
| OTHER | | | | | | | 2 |

Chief of Operations

Forty lieutenant colonels, forty majors, six captains, three NCOs and two civilians were authorized in the position of Chief of Operations according to the responses received from survey question Q.22. The results of survey question Q.23, however, showed that twenty-two lieutenant colonels, forty-eight majors, thirteen captains, four NCOs, and four civilians were assigned to the position of Chief of Operations. Table 9 shows that 50 percent of the lieutenant colonel authorizations were filled with majors and seventeen percent of the major authorizations for Chief of Operations were filled by captains.

TABLE 9

AUTHORIZED (Q.22) VS ASSIGNED (Q.23) RANK OF DEM

| AUTHORIZED RANK CHIEF OF OPS (Q.22) | ASSIGNED RANK CHIEF OF OPS (Q.23) | | | | |
|---|---|---|---|---|---|
| | Lt Col | Maj | Capt | NCO | CIV |
| Lt Col | 19 | 20 | 1 | | |
| Maj | 3 | 28 | 7 | | |
| Capt | | | 5 | 1 | |
| NCO | | | | 3 | |
| CIV | | | | | 2 |

Survey question Q.24 was developed to determine if the Chief of Operations had approval authority for maintenance and repair type work on real property facilities. Prior to the 1978 revision of Air Force Regulation 85-1, Resources and Work Force Management, the Chief of Operations had no approval authority. The mode of 84.6 percent stated that indeed the Chief of Operations had approval authority for maintenance and repair type work.

## Research Question Seven

**How well are lieutenants performing in authorized major and captain positions?**

How well lieutenants were performing their duties, their adaptability to stress, and the quality of engineer designed projects produced by the base-level Civil Engineering organization were considered

indicators of how well lieutenants were coping in major and captain positions. Survey question Q.31 asked the BCEs their perception of how the lieutenants were performing compared with the BCEs' expectations.

The mode of responses to survey question Q.31, 49.5 percent, "agreed" that lieutenants were performing above BCE expectations. The mean for the Likert-scale question was 2.165 which meant that the BCEs "agreed" with the question statement. The BCEs also perceived that lieutenants were handling the stresses of responsible Civil Engineering middle management positions well.

Survey question Q.33 was a Likert-scale question stating that the responsibility placed on lieutenants was too great a strain on them. Fifty-four percent of the responses, the mode for the survey question, "disagreed" with the question statement. The secondary responses were bimodal with 21 percent of the respondents "strongly disagreeing" with the survey question and eighteen respondents "agreeing" with the question statement. The mean of the responses was 3.68 which indicates that the BCEs "disagreed" with the survey question statement of too much stress on lieutenants and that lieutenants are adapting well to stress in the base-level Civil Engineering organization. Finally, survey question Q.35 indicated that production by lieutenants in captains and majors positions was of high quality.

When the BCEs were asked whether the quality of projects designed by the Engineering Branch had decreased, the mean answer to Likert-scale survey question Q.35 indicated indecision. The mean of 2.912 was in the "undecided" area of the Likert-scale. The mode of the responses was 32 percent "disagreeing" with the survey question statement and a secondary

mode of 30 percent of the responses which "agreed" with the statement. The lieutenants in authorized major and captain CE positions were performing and coping very well.

# CHAPTER V

## CONCLUSIONS

The two major objectives of this research effort stated in Chapter I were:

(1) Determine the impact of the shortage of major and captain Civil Engineering officers on the base-level Civil Engineering organization.

(2) Determine whether any single branch or area of the base-level Civil Engineering organization is impacted more seriously than any other branch by the lack of authorized majors and captains.

Answers to research questions one, four, six, and seven were analyzed to obtain information in support of the first major objective. The results of the analyses were reported in Chapter IV. For the second major objective, research questions two, three, and five were analyzed and the results of the analyses, as related to the second major objective, also are explained in Chapter IV. The purpose of this chapter is to state the conclusions reached on the two major objectives and the three secondary research objectives. The secondary research objectives were:

(1) Determine the extent to which maintenance, repair, and minor construction capabilities are lowered in the base-level Civil Engineering organization.

(2) Determine if engineering, construction management or industrial engineering activities are affected by the shortage of authorized majors and captains.

(3) Determine what officer levels and experience levels are filling authorized major and captain positions.

## Major Research Objectives

The major research objectives of this research effort concerned the shortage of middle management officers in the Civil Engineering career field. The first major objective was to determine the impact on the base-level CE organization.

### Research Objective One

> Determine the impact of the shortage of major and captain Civil Engineering officers on the base-level Civil Engineering organization.

The research questions used to evaluate the first research objective indicated that the impact of the shortage of major and captain Civil Engineering career field officers caused increased decision making on the part of the Base Civil Engineers, placed less qualified officers in key maintenance positions, and reduced the quality of role models lieutenants could look up to for examples. However, the lieutenants placed in authorized captain and major CE officer positions were doing a good job. The impact of the shortage of authorized majors and captains was therefore felt throughout the base level Civil Engineering organization.

### Research Objective Two

> Determine whether any single branch or area of the base-level Civil Engineering organization is impacted more seriously than any other branch by the lack of authorized majors and captains.

The second research objective, to determine whether any single branch or area within the base-level Civil Engineering organization was impacted more seriously than any other branch, was reached using the analyses of the related research questions. The Operations Branch (DEM) was impacted the greatest by the shortage of authorized majors and the Engineering and Environmental Planning Branch (DEE) was impacted the greatest by the shortage of authorized captains. The Administration Branch (DEA) was impacted the least by both the shortage of majors and the shortage of captains. The shortage of major and captain Civil Engineering officers might also have had an impact on the approval authority of Base Civil Engineers. As an example, research question five showed that approval authority for maintenance, repair, and minor construction type work was 30 to 60 percent higher for the BCEs than the same type approval authority for base-level major and captain authorized positions. The BCEs were also making more daily decisions due to the shortage of authorized majors and captains according to the analyses of the responses.

## Secondary Research Objectives

The conclusions to the three secondary objectives were drawn from the information obtained from the seven research questions. The first of the secondary research objectives concerned the mission capabilities of the base-level Civil Engineering organizations.

### Secondary Objective One

> Determine the extent to which maintenance, repair, and minor construction capabilities are lower in the base-level Civil Engineering organization.

The results of research question five indicated that the capabilities of the base-level Civil Engineering organization in the performance of maintenance, repair, and minor construction type work had not decreased due to the shortage of authorized majors and captains. The majority of the BCEs responded that maintenance, repair, and minor construction type work remained at previous levels and were not affected by the shortage.

Secondary Objective Two

> Determine if engineering, construction management, or industrial engineering activities are affected by the shortage of authorized majors and captains.

The results of research question five and survey question Q.35 indicated that the BCEs were undecided as to whether or not the quality of projects produced by the Engineering and Environmental Planning Branch had increased or decreased as a result of the major and captain shortage.

Identical results were obtained about the activities of the Industrial Engineering Branch. This research effort was unable to determine if the shortage of authorized major and captain personnel affected the base-level Civil Engineering organization in the engineering, construction management or industrial engineering activities. Secondary research objective three was deterministic using research questions six and seven.

Secondary Objective Three

> Determine what officer levels and experience levels are filling authorized major and captain positions.

Table 8 and Table 9 on pages 51 and 52 show the results of authorized major and captain positions for the Chief of Operations and the Chief of Resources and Requirements. The tables also show the associated officer ranks assigned to those authorized middle management positions. The results of research question seven indicated that lieutenants assigned to major and captain authorized positions were performing above the expectations of the BCEs. In assition, the amount of stress and responsibility placed upon the lieutenants assigned to authorized major and captain positions, was perceived to be handled well by the lower ranking officers.

## Research Questions Conclusions

The responses to the Shortage of Civil Engineering Majors and Captains Impact Questionnaire enabled the following conclusions to be drawn about the seven research questions.

### Research Question One

> To what extent is the numerical shortage of authorized major and captain officers, in the Civil Engineering career field, affecting the USAF base-level Civil Engineering organization?

The results of the associated survey questions indicated that the base-level Civil Engineering organization was affected by the shortage of authorized majors and captains. Captains were filling major authorizations and lieutenants were filling both major and captain authorized positions. Additional comments received from the BCEs indicated that an additional effect of the shortage was that the quality of role models and qualified trainers for the lower ranking officers were decreasing.

Research Question Two

Where, in the base-level Civil Engineering organization is the shortage of authorized majors concentrated?

The results of the responses to the associated survey questions indicated that the primary shortage of majors was concentrated in the Operations Branch, with the Chief of Operations the most severely impacted authorized position. The least impacted base-level CE branch was the Administration Branch.

Research Question Three

Where, in the base-level Civil Engineering organization, is the shortage of authorized captains concentrated?

The branch impacted the greatest by the shortage of authorized CE captains was the Engineering and Environmental Planning Branch. The Administration Branch followed closely by the Industrial Engineering Branch were perceived as least impacted by the authorized captain shortage. However, the BCEs considered the Chief of Resources and Requirements and the Chief of Readiness and Logistics as the first and second most important authorized captain positions, respectively. The least important authorized captain positions were stated by the responses to be those in the Engineering and Environmental Planning Branch.

Research Question Four

Is the shortage of authorized majors and captains having an impact on middle management decision making about base-level Civil Engineering activities?

The responses of the Base Civil Engineers indicated that decision making, about CE activities, was moved to higher management levels due to the shortage. The Chief of Resources and Requirements had an average maintenance approval authority of $77,000.00, repair approval authority of $68,000.00, and minor construction approval authority of $7,700.00. The Chief of Operations had an average minor construction approval authority of $12,475.00. The BCEs had much higher average approval authorities of $195,000.00 for maintenance; $104,000.00 for repair; and $17,000.00 for minor construction type work. The conclusion of research question four was that the BCEs were making more of the decisions that might have been made by authorized majors and captains.

Research Question Five

Where is the shortage impacting the base-level Civil Engineering organization?

The results, compiled from the respondents, indicated an increase in the daily decision making of the Base Civil Engineer caused by less majors and captains. The BCEs were undecided whether the Industrial Engineering Branch or the Engineering and Environmental Planning Branch were impacted by the shortage of majors and captains. The approval authorities of the BCEs were well above those of the Chief of Operations or the Chief of Resources and Requirements which might indicate that the BCEs had less trust in their middle management officer positions. Finally, the BCEs stated that the levels of maintenance, repair, and minor construction type work had not decreased due to the shortage of major and captain authorized personnel.

Research Question Six

What key maintenance and repair management positions in the base-level Civil Engineering organization are affected by the shortage of authorized majors and captains?

Both the Chief of Operations and the Chief of Resources and Requirements were key maintenance and repair management positions affected by the shortage of authorized majors and captains. Tables 8 and 9 on pages 51 and 52 reflect how the authorized positions were filled with assigned personnel. Majors were filling authorized lieutenant colonel positions while captains were filling authorized major positions. Authorized major positions seemed to be affected more than authorized captain positions in the maintenance and repair management positions.

Research Question Seven

How well are lieutenants performing in authorized major and captain positions?

The lieutenants, in the base-level Civil Engineering organization, were performing well above the expectations of the Base Civil Engineers. The amount of stress and responsibility placed on lieutenants, assigned to authorized major and captain positions, was perceived to be within the tolerance levels of lieutenants. The lieutenants were performing very well in authorized major and captain positions as well as in their lieutenant authorized positions.

# CHAPTER VI

## RECOMMENDATIONS AND FUTURE CONSIDERATIONS

This chapter contains the recommendations and future research considerations that resulted from the research effort.

### Recommendations

The Air Staff and the Air Force Engineering and Services Center must take action to procure and retain qualified Civil Engineering junior officers. The inability to retain junior officers is probably one of the major causes of the shortage of Civil Engineering majors and captains. Unless there is an increase in the number of CE major and captain middle management officers assigned, the Base Civil Engineer will have an increase in his/her daily decision about CE activities. Lieutenants, in the CE career field, are selecting role models from a decreasing quantity of majors and captains and are being trained by fewer and fewer majors and captains. Unless more Civil Engineering majors and captains are available in the future, the perpetuation of the shortage and its effects will continue.

The descriptive statistics generated by the survey questionnaire have no basic Air Force standards or criteria on which to base a comparison. However, the means, modes, standard deviations, and crosstabulations, reported by this research effort, should be used as a baseline for future research on the shortage of major and captain CE officers. The survey

questionnaire instrument is included in Appendix A and a copy of the computer program and the data base, from the responding Base Civil Engineers, is included in Appendix H, for use as a data base in future research efforts.

## Future Research Considerations

Future considerations, not covered by this research effort, but which could lead to related areas of research, or improvements in the overall Civil Engineering career field, are listed below.

### Survey Questionnaire

(1) Some base-level Civil Engineering organizations may not have a major or a captain authorization. Responses should include considerations for no major or captain authorization or a "Not Applicable" answer if such categories are possible.

(2) This research effort found that the approval authority of the Chief of Resources and Requirements was below $100,000.00 for maintenance and repair and below $10,000.00 for minor construction type work. Future research efforts should try and narrow the actual approval authority categories so that extrapolation takes place within narrower monetary bands.

### Prime BEEF Implications

Authorized major and captain base-level Civil Engineering officer positions also implies Primary Base Engineer Emergency Force (Prime BEEF) officer positions. If the shortage of authorized majors and captains is impacting the maintenance, repair, and minor construction activities, it could also impact the training and readiness of base-level Prime BEEF

contingency teams. The capabilities of the Prime BEEF teams could be reduced and the level of leadership could be affected. The effects of the shortage of authorized major and captain Civil Engineering officers could be expanded to investigate the impact, if any, on Prime BEEF teams.

Repeat Study

This research effort consisted of gathering data and reporting descriptive statistics on the results of the survey question responses. Descriptive statistics were used because no previous research effort could be located by which standards or variations could be measured. Now that one research effort has been accomplished, a replication study, in two or three years, might produce results which could be correlated with an increase or decrease in the shortage parameters.

BCE Decision Making

The results of this research effort showed that decision making, on the part of the Base Civil Engineer, had increased due to the shortage of authorized majors and captains within the base-level CE organization. The types and quantities of the decisions made by the BCEs and the position and rank of the officer, non-commissioned officer or civilian who would normally make those decisions, could possibly enlighten BCEs to base-level responsibilities of organizational branches.

Other Considerations

The following are submitted as additional future research considerations:

(1) What is the quality, not necessarily the quantity, of the

officers entering the Civil Engineering career field?

(2) Are the major and captain Civil Engineering officers being overworked in the authorized positions to which they are assigned and if they are overworked, is it causing them to leave the military service?

(3) Are the majors and captains, remaining in the Civil Engineering career field, being disproportionately passed over for promotions, and if so, why are they not being promoted?

APPENDICES

# APPENDIX A

## SHORTAGE OF CIVIL ENGINEERING MAJORS AND CAPTAINS IMPACT QUESTIONNAIRE

DEPARTMENT OF THE AIR FORCE
AIR FORCE INSTITUTE OF TECHNOLOGY (ATC)
WRIGHT-PATTERSON AIR FORCE BASE, OH 45433

REPLY TO ATTN OF: LSH (LSSR 64-81)/ Capt. Leoutseas/ Capt. McDonald/ Autovon 78-56569

10 April 1981

SUBJECT: Shortage of C.E. Majors and Captains Impact Questionnaire

TO: Base Civil Engineer (DE)

1. The attached questionnaire was prepared by a thesis research team at the Air Force Institute of Technology, Wright-Patterson AFB, Ohio. The purpose of the questionnaire is to accumulate data from Base Civil Engineers (BCEs) about the shortage of majors and captains in the Civil Engineering Career Field and the impact caused by the shortage.

2. You are requested to provide an answer or comment for each question. Headquarters USAF Survey Control Number 81-40 has been assigned to this questionnaire. Your participation in this research is voluntary.

3. Your responses to the questions will be held confidential. Please remove this cover sheet before returning the completed questionnaire. Your cooperation in providing this data will be appreciated and will be very beneficial in examining the impact of the shortage of majors and captains in the Civil Engineering Career Field. Please return the completed questionnaire in the attached envelope within one week after receipt.

CHARLES R. MARGENTHALER, Col, USAF
Dean
School of Systems and Logistics

Atch
1. Questionnaire
2. Return Envelope

USAF SCN 81-40
(Expires 30 Jun 81)

## PRIVACY STATEMENT

In accordance with paragraph 8, AFR 12-35, the following information is provided as required by the Privacy Act of 1974:

a. Authority:

(1) DOD Instruction 1100.13, 17 Apr. 68, Surveys of Department of Defense Personnel;

(2) AFR 30-23, 22 Sep. 76, Air Force Personnel Survey Program.

b. Principal purposes. The survey is being conducted to collect information to be used in research aimed at illuminating and providing inputs to the solution of problems of interest to the Air Force.

c. Routine Uses. The survey data will be converted to information for use in research of management related problems. Results of the research, based on the data provided, will be included in written master's theses and may also be included in published articles, reports, or texts. Distribution of the results of the research, based on the survey data, whether in written form or presented orally, will be unlimited.

d. Participation in this survey is entirely voluntary.

e. No adverse action of any kind may be taken against any individual who elects not to participate in any or all of this survey.

## A SHORTAGE OF CIVIL ENGINEERING MAJORS AND CAPTAINS

## IMPACT QUESTIONNAIRE

The purpose of this survey is to compile the opinions and perceptions of Base Civil Engineers (BCEs) on the shortage of major and captain Civil Engineering Officers; the impact of the shortage on daily decision making, and the branch of the Civil Engineering Organization where the impact is concentrated.

Please record your responses on the questionnaire itself.

The approximate time required to complete this questionnaire is twelve minutes.

1. What is your active duty grade?

_____ (a) Colonel
_____ (b) Lieutenant Colonel
_____ (c) Major
_____ (d) Captain

2. How much total active military service do you have?

_____ (a) 8 but less than 12 years
_____ (b) 12 but less than 16 years
_____ (c) 16 but less than 20 years
_____ (d) 20 but less than 24 years
_____ (e) 24 but less than 28 years
_____ (f) Over 28 years

3. How long have you been in the Civil Engineering Career Field?

_____ (a) Less than 5 years
_____ (b) 5 but less than 10 years
_____ (c) 10 but less than 15 years
_____ (d) Over 15 years

4. Have you attended the Base Civil Engineering Staff Officers Course at AFIT, Wright-Patterson AFB?

_____ (a) Yes
_____ (b) No
_____ (c) Scheduled to attend within the next 6 months

5. How many officers are authorized in your organization?

_____ (a) Less than 5 officers
_____ (b) 5 but less than 10 officers total
_____ (c) 10 but less than 15 officers total
_____ (d) 15 but less than 20 officers total
_____ (e) 20 but less than 25 officers total
_____ (f) Greater than 25 officers

6. How many captains are authorized in your organization?

_____ (a) 1
_____ (b) 2
_____ (c) 3
_____ (d) 4
_____ (e) 5
_____ (f) # _____

7. How many of your captain authorizations are filled by captains?

_____ (a) 1
_____ (b) 2
_____ (c) 3
_____ (d) 4
_____ (e) 5
_____ (f) More than 5

8. How many of your captain authorizations are filled with officers below the authorized grade?

_____ (a) 1
_____ (b) 2
_____ (c) 3
_____ (d) 4
_____ (e) 5
_____ (f) More than 5

9. How many majors are authorized in your organization?

_____ (a) 1
_____ (b) 2
_____ (c) 3
_____ (d) 4
_____ (e) 5
_____ (f) More than 5

10. How many of your major authorizations are filled by majors?

_____ (a) 1
_____ (b) 2
_____ (c) 3
_____ (d) 4
_____ (e) 5
_____ (f) More than 5

11. How many of your major authorizations are filled with officers below the authorized grade?

_____ (a) 1
_____ (b) 2
_____ (c) 3
_____ (d) 4
_____ (e) 5
_____ (f) More than 5

12. How many of your major authorizations are filled by lieutenants?

_____ (a) 1
_____ (b) 2
_____ (c) 3
_____ (d) 4
_____ (e) 5
_____ (f) 0

13. What branch of your organization is impacted the greatest by the shortage of majors?

_____ (a) DEA
_____ (b) DEE
_____ (c) DEF
_____ (d) DEH
_____ (e) DEI
_____ (f) DEM
_____ (g) Other _____

14. What branch of your organization is impacted the least by the shortage of majors?

_____ (a) DEA
_____ (b) DEE
_____ (c) DEI
_____ (d) DEM
_____ (e) Other _____

15. What branch of your organization is impacted the greatest by the shortage of captains?

_____ (a) DEA
_____ (b) DEE
_____ (c) DEF
_____ (d) DEH
_____ (e) DEI
_____ (f) DEM
_____ (g) Other _____

16. What branch of your organization is impacted the least by the shortage of captains?

_____ (a) DEA
_____ (b) DEE
_____ (c) DEI
_____ (d) DEM
_____ (e) Other _____

17. What is the authorized rank of your Cheif of Resources and Requirements?

_____ (a) Second Lieutenant
_____ (b) First Lieutenant
_____ (c) Captain
_____ (d) Major
_____ (e) NCO
_____ (f) Civilian: Grade _____

18. What is the rank of your assigned Chief of Resources and Requirements?

_____ (a) Second Lieutenant
_____ (b) First Lieutenant
_____ (c) Captain
_____ (d) Major
_____ (e) NCO
_____ (f) Civilian: Grade _____

19. What is the maintenance project approval authority of your Chief of Resources and Requirements?

_____ (a) $400,000 or less
_____ (b) $300,000 or less
_____ (c) $200,000 or less
_____ (d) $100,000 or less
_____ (e) $50,000 or less

20. What is the repair project approval authority of your Chief of Resources and Requirements?

_____ (a) $400,000 or less
_____ (b) $300,000 or less
_____ (c) $200,000 or less
_____ (d) $100,000 or less
_____ (e) $50,000 or less

21. What is the minor construction project approval authority of your Chief of Resources and Requirements?

_____ (a) Less than $5,000
_____ (b) $5,000 but less than $10,000
_____ (c) $10,000 but less than $15,000
_____ (d) Greater than $15,000

22. What is the authorized rank of your Chief of Operations?

_____ (a) Second Lieutenant
_____ (b) First Lieutenant
_____ (c) Captain
_____ (d) Major
_____ (e) Lt. Colonel
_____ (f) NCO
_____ (g) Civilian: Grade _____

23. What is the rank of your assigned Chief of Operations?

_____ (a) Second Lieutenant
_____ (b) First Lieutenant
_____ (c) Captain
_____ (d) Major
_____ (e) Lt. Colonel
_____ (f) NCO
_____ (g) Civilian: Grade _____

24. Does your Chief of Operations have approval authority for maintenance and repair work?

_____ (a) Yes
_____ (b) No

25. What minor construction project approval authority does your Chief of Operations have?

_____ (a) Less than $5,000
_____ (b) $5,000 but less than $10,000
_____ (c) $10,000 but less than $15,000
_____ (d) $15,000 but less than $25,000
_____ (e) The Chief of Operations has no approval authority

26. What is the rank of the military officer who acts in your stead?

_____ (a) Colonel
_____ (b) Lt. Colonel
_____ (c) Major
_____ (d) Captain
_____ (e) First Lieutenant
_____ (f) Second Lieutenant

27. What is your maintenance project approval authority?

_____ (a) $500,000 or less
_____ (b) $400,000 or less
_____ (c) $300,000 or less
_____ (d) $200,000 or less
_____ (e) $100,000 or less

28. What is your repair project approval authority?

_____ (a) $400,000 or less
_____ (b) $300,000 or less
_____ (c) $200,000 or less
_____ (d) $100,000 or less
_____ (e) $50,000 or less

29. What is your minor construction project approval authority?

_____ (a) Less than $5,000
_____ (b) $5,000 but less than $10,000
_____ (c) $10,000 but less than $15,000
_____ (d) $15,000 but less than $25,000

30. The activities of the Industrial Engineering (DEI) Branch have decreased because of the shortage of majors and/or captains.

_____ (a) Strongly agree
_____ (b) Agree
_____ (c) Undecided
_____ (d) Disagree
_____ (e) Strongly disagree

31. The lieutenants assigned to my organization are performing above my expectations in the Civil Engineering Career Field.

_____ (a) Strongly agree
_____ (b) Agree
_____ (c) Undecided
_____ (d) Disagree
_____ (e) Strongly disagree

32. The shortage of majors and/or captains is increasing the number of decisions I personally must make about Base Civil Engineering activities.

_____ (a) Strongly agree
_____ (b) Agree
_____ (c) Undecided
_____ (d) Disagree
_____ (e) Strongly disagree

33. The amount of responsibility assigned to lower ranking officers places too great a strain on them.

_____ (a) Strongly agree
_____ (b) Agree
_____ (c) Undecided
_____ (d) Disagree
_____ (e) Strongly disagree

34. The level of maintenance, repair, and minor construction at my base has decreased because of the lack of qualified Civil Engineering majors and captains.

_____ (a) Strongly agree
_____ (b) Agree
_____ (c) Undecided
_____ (d) Disagree
_____ (e) Strongly disagree

35. The quality of projects produced by the Engineering Branch has decreased with the shortage of majors and/or captains.

_____ (a) Strongly agree
_____ (b) Agree
_____ (c) Undecided
_____ (d) Disagree
_____ (e) Strongly disagree

36. What authorized captain position do you consider the least important in your organization? Why?

37. What authorized captain position do you consider the most important? Why?

38. What authorized major position do you consider the least important? Why?

39. What authorized major position do you consider the most important? Why?

ADDITIONAL COMMENTS:

If you would like the consolidated response of this questionnaire, please fill in the information below.

Organization:

Base:

Zip Code:

Results available approximately 30 June 1981

## APPENDIX B

## LIST OF BASES IN CIVIL ENGINEERING POPULATION, AS OF APRIL 1981, MAILED QUESTIONNAIRES

## CONUS BASES

1 CEGSQ
Langley AFB, VA
23665

2 CEGSQ
Barksdale AFB, LA
71110

4 CEGSQ
Seymour Johnson AFB, NC
27531

7 CEGSQ
Carswell AFB, TX
76127

14 CEGSQ
Columbus AFB, MS
39701

22 CEGSQ
March AFB, CA
92508

23 CEGSQ
England AFB, LA
71301

27 CEGSQ
Cannon AFB, NM
88101

31 CEGSQ
Homestead AFB, FL
33039

35 CEGSQ
George AFB, CA
92392

42 CES
Loring AFB, ME
04750

46 CEGSQ
Peterson AFB, CO
80914

47 CEGSQ
Laughlin AFB, TX
78840

49 CEGSQ
Holloman AFB, NM
88330

56 CEGSQ
MacDill AFB, FL
53608

57 CEGSQ
Nellis AFB, NV
89191

58 CEGSQ
Luke AFB, AZ
85309

60 CEGSQ
Travis AFB, CA
94535

62 CEGSQ
McChord AFB, WA
98438

63 CEGSQ
Norton AFB, CA
92409

64 CEGSQ
Reese AFB, TX
79489

67 CEGSQ
Bergstrom AFB, TX
78743

44 CEGSQ
Ellsworth AFB, SD
57706

82 CES
Williams AFB, AZ
85224

90 CES
F E Warren AFB, WY

91 CES
Minot AFB, ND
58705

92 CES
Fairchild AFB, WA
99011

93 CES
Castle AFB, CA
95342

96 CES
Dyess AFB, TX
79607

97 CES
Blythville AFB, AR
72315

100 CES
Beale AFB, CA
95903

305 CES
Grissom AFB, IN
46971

314 CES
Little Rock AFB, AR
72076

317 CES
Pope AFB, NC
28308

321 CES
Grand Forks AFB, ND
58205

76 CES
Andrews AFB, DC
20331

347 CES
Moody AFB, GA
31601

351 CES
Whiteman AFB, MO

354 CES
Myrtle Beach AFB, SC
29577

355 CES
Davis Monthan AFB, AZ
85707

363 CES
Shaw AFB, SC
29152

366 CES
Mt Home AFB, ID
83648

375 CES
Scott AFB, IL
62225

379 CES
Wurtsmith AFB, MI
48753

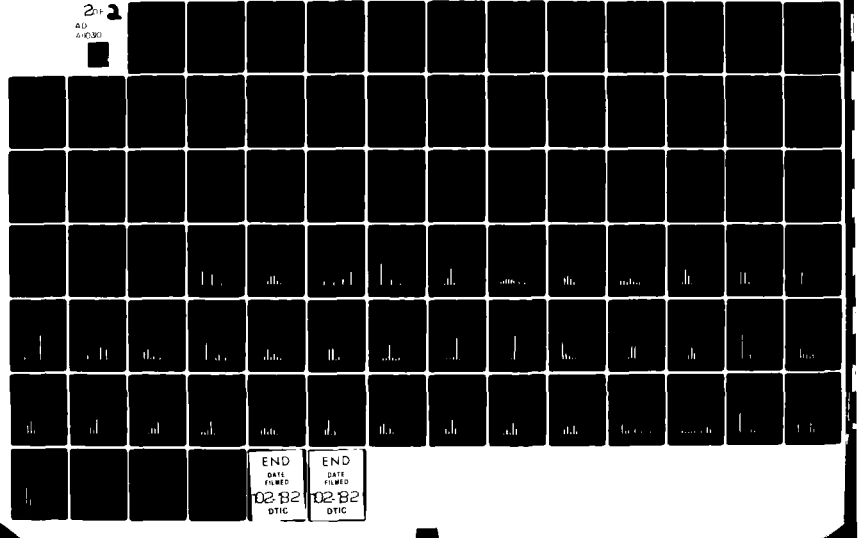
380 CES
Plattsburgh AFB, NY
12903

381 CES
McConnell AFB, KS
67221

410 CES
K I Sawyer AFB, MI
49843

416 CES
Griffiss AFB, NY
13441

AD-A110 310 AIR FORCE INST OF TECH WRIGHT-PATTERSON AFB OH SCHOOL--ETC F/6 15/5
IMPACT OF THE SHORTAGE OF MAJOR AND CAPTAIN CIVIL ENGINEERING O--ETC(U)
SEP 81 W M MCDONALD, C P LEOUTSEAS
UNCLASSIFIED AFIT-LSSR-64-81 NL



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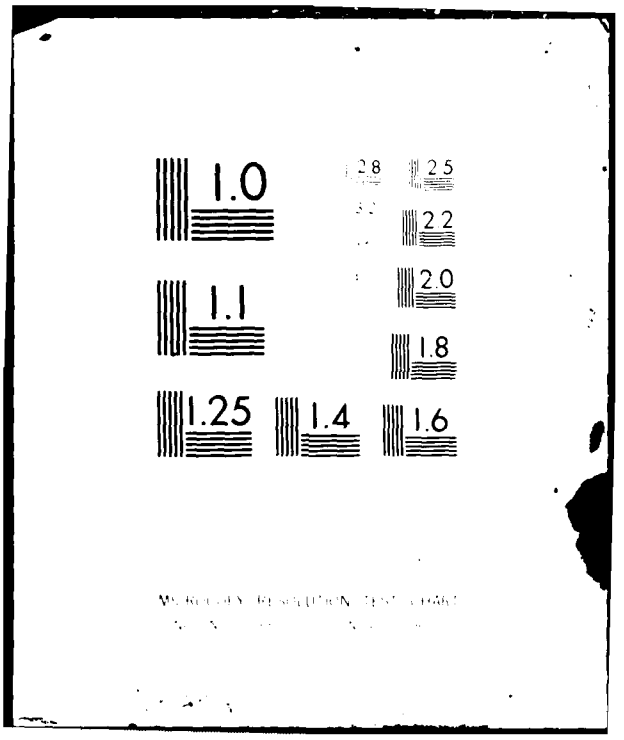
1.0
1.1
1.25
1.4
1.6
2.0
2.2
2.5

323 CES
Mather AFB, CA
95655

341 CES
Malmstrom AFB, MT
59402

438 CES
McGuire AFB, NJ
08641

443 CES
Altus AFB, OK
73521

509 CES
Pease AFB, NH
03801

820 CEHSQ (RED HORSE)
Lake Mead Base, NV
89110

823 CEHSQ (RED HORSE)
Hulburt Fld Eglin AFB, FL
32544

834 CES
Hulburt Fld Eglin AFB, FL
32544

1100 CES
Bolling AFB, DC
20332

1606 CES
Kirtland AFB, NM
87117

2750 CES
Wright Patterson AFB, OH
45433

2849 CES
Hill AFB, UT
84056

2852 CES
McClellan AFB, CA
95652

436 CES
Dover AFB, DE
19901

437 CES
Charleston AFB, SC
29404

3245 CES
Hanscom AFB, MA
01731

3345 CES
Chanute AFB, IL
61868

3380 CES
Keesler AFB, MS
39534

3415 CES
Lowry AFB, CO
80230

3480 ABG/DE
Goodfellow AFB, TX
76903

3750 CES
Sheppard AFB, TX
76311

3800 ABW/DE
Maxwell AFB, AL
36112

3902 CES
Offutt AFB, NE
68113

4392 CES
Vandenberg AFB, CA
93437

4756 CES
Tyndall AFB, FL
32403

4787 CES
Duluth IAP, MN
55814

2853 CES
Robins AFB, GA
31098

2854 CES
Tinker AFB, OK
73145

3202 CES
Eglin AFB, FL
32542

7625 CES
USAF Academy, CO
80840

AFWL/DE
Kirtland AFB, NM
87117

4789 ABG/DE
Hancock Field, NY
13225

6510 CES
Edwards AFB, GA
93523

6550 CES
Patrick AFB, FL
32925

ASD/DE
Wright Patterson, AFB, OH
45433

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## OVERSEAS LOCATIONS

3 CES
Clark AB, Phil
APO SF, 96274

8 CES
Kunsan AB, Korea
APO SF, 96264

10 CES
RAF Alconbury, UK
APO NY, 09238

15 CES
Hickam AFB, HI
96853

18 CSG/DE
Kadena AB, Japan
APO SF, 96239

20 CES
RAF Upper Heyford, UK
APO NY, 09194

21 CES
Elmendorf AFB, AK
99506

40 CEGFIT/DE
Aviano ABS, Italy
APO NY, 09293

43 CES
Andersen AFB, Guam
APO SF, 96334

48 CES
RAF Lakenheath, UK
APO NY, 09179

50 CES
Hahn ABS, Germany
APO NY, 09109

51 CES
Osan ABS, Korea
APO SF, 96570

52 CES
Spangdahlem ABS, Germany
APO NY, 09123

81 CES
RAF Bentwaters, UK
APO NY, 09755

24 CES
Howard AFB, Panama
APO Miami, 34001

26 CES
Zweibruken ABS, Germany
APO NY, 09860

36 CES
Bitburg ABS, Germany
APO NY, 09132

39 CSG/DE
Incirlik AB, Turkey
APO NY, 09289

554 CEHSQ (RED HORSE)
Osan ABS, Korea
APO SF, 96570

554 CEHSQ (RED HORSE
Kunsan ABS, Korea
APO SF, 96264

601 CES
Sembach ABS, Germany
APO NY, 09130

819 CEHSQ (RED HORSE)
RAF Wethersfield, UK
APO NY, 09120

5010 CES
Eielson AFB, AK
99702

1605 CES
Lajes Field ABS, Portg
APO NY, 09406

6112 CES
Misawa AB, Japan
APO SF, 96519

86 CES
Ramstein ABS, Germany
APO NY 09283

435 CES
Rhein Main ABS, Germany
APO NY, 09057

475 CES
Yokota AB, Japan
APO SF, 96328

513 CES
RAF Mildenhall, UK
APO NY, 09127

7020 ABG/DE
RAF Feirford, UK
APO NY, 09125

7100 ABS/DE
Lindsay AS, Germany
APO NY, 09633

7274 ABG/DE
RAF Chicksands, UK
APO NY, 09193

7275 ABG/DE
San Vito AS, Italy
APO NY, 09240

7350 ABG/DE
Tempelhof IAP, Berlin
APO NY, 09611

7502 CES
RAF Ruislip, UK
APO NY, 09241

# APPENDIX C

## ADDITIONAL COMMENTS RECEIVED FROM SURVEY QUESTIONNAIRE

It is a problem, but our Lieutenants are doing a good job and have great potential. Our E-8's and E-9's are available for additional responsibilities too.

We are acutely aware of this problem, having been 83 percent manned in officers for some time.

Second Lieutenants can't replace experience unless they're prior service and working in the same career field. There is so much pressure from changing priorities, commanders, and higher HQ's that most young officers don't know what to do. Civilians are sometimes good for these positions, but the eight hour work day restrictions seriously affects doing these jobs completely. The positions outlined in item thirty-eight above (DEMR, DEEE, DEEC, DEEV) are extremely important for conduct of day-to-day operations. They are all pulse points.

Too many Second Lieutenants are having to carry the load.

Lieutenants currently fill captain authorizations because there aer no captains. My job is to teach them to be managers and leaders, not designers. They should leave base-level with a full working knowledge of the importance of each branch, not just one, because they will not return to my level for another three to six years.

Without middle management, career guidance and motivation to young officers is extremely difficult. Lieutenants wonder what jobs and challenges are between them and being a Colonel BCE because there is presently no middle management level.

I am concerned about the low quality of captains and majors at base-level for two reasons: (1) They are normally in influencial positions, and (2) They serve as role models for younger officers.

This survey fails to consider experience. My major and one captain are rated supplement types with less than one year of CE experience.

Lack of captains and majors requires much more of our Lieutenants. We find that career decisions may be made earlier due to increased opportunity for responsibility. On the other hand, some "burn out" occurs faster from hitting their head against the wall of doing "more with less." Civil Engineering has low priority for supplies, vehicles, etc., until the emergency comes. They see less pressure in other career fields.

The lieutenants are doing a good job. Nothing can replace majors and captains with experience. The learning curve for lieutenants is there and we as BCEs must recognize that and work the problem the best that we can. The bottom line is, we need to recruit good lieutenants and pay them as well as all engineers a comparative wage!

I suggest that more officer positions be assigned to Construction Management and to Planning. There are too many mandatory assignments, by APSC, to non-critical positions. Experience should be gained in those positions, but they should not be a mandatory assignment.

If there were more major positions, my DEE branch should be headed by a major instead of a captain.

Two assigned captains entered the Civil Engineering field as captains, and while they have excellent technical knowledge, they lack a background in all CE functions. Officers who enter as lieutenants and progress through various functions are more useful and productive when they make captain.

You missed a major point--quality. Only two of my five captains has an OER file that will permit promotion to major. At base-level we either have officers who have no experience or officers who have no growth potential if they have experience. The lieutenants suffer from having poor or no captains and majors to train them.

The main problem with being assinged junior officers is the lack of the required level of maturity in dealing with other base organizations.

This squadron is relatively well manned with civilian engineers. Hence, the absolute need for lieutenants and captains--or engineers-- is not that great.

I have been assigned at this base for over three years and have been pleasantly surprised with the excellent caliber of officers I have had in my organization. The new officers arriving this summer does appear to be younger. (I'm getting one second lieutenant to replace a captain so far).

With second lieutenants filling our captain and major authorizations, our productivity will continue to drop. Proper training is required. Much time is spent in providing guidance and direction. Although this is time consuming, they are trained properly.

I feel that I need another major to head the Engineering Construction and Environmental Planning Branch. The dollar value of projects and constant pressure on this branch requires the rank and experience of a major.

The captain/major shortage in engineering has been created in part by lack of pay. I think engineers need professional pay similar to flight pay if the Air Force is to keep captain/majors in service.

I think your study could be more beneficial to the Air Force if you examined the causes for the shortage of captains and majors in CE.

If the Air Force doesn't do something about the officer shortage, the CE field is in for real problems!

Experience is what is most important in a CE officer--whether it be a lieutenant or a major. The requirement to have experienced civilians and NCO's in positions cannot be overlooked.

The shortage of majors and/or captains has not yet had a significant impact at this overseas location.

Lots of young lieutenants are entirely capable of filling job demands--but senior officers must spend time training, providing guidance and defining expectations of duty performance.

At this overseas remote location we are 100 percent manned in all grades. Your survey presumes a shortage, therefore, questions are biased and sometimes not applicable.

In July, I lose two captains who sill be replaced by lieutenants. Next year I could better assess the impact of the shortage of captains.

If we don't start promoting our captains and majors, we son't have any. I've had three major passovers, no captains eligible. My seven new lieutenants are not very impressed with the percentage.

Most positions at this isolated, but extremely strategic location seem to be one grade lower than required, including mine. I have attached the comments of my MAJCOM on my position and the other deficient grades follow along under the same justification.

If the Air Force wants to retain majors and senior captains beyond twenty years, it better improve promotion selection. When lieutenants and junior captains see the amount of work performed, the task levied upon Civil Engineering, the long hours expended in overtime, the pay differences with the "outside", etc., and then see CE officers not selected for promotion, they get out. I can no longer encourage my young officers to stay beyond their initial commitment. The self satisfaction of a job well done no longer overrides the harassments, the long hours, the frustrations of "doing more with less", and the lack of recognition and promotion. I know too many CE officers who have been busting their "tails" for fifteen and more years for the Air Force (myself included) to find themselves passed over for the "8 to 5" guy. If the Air Force is telling us all they want is twenty years, it's doing a good job. One day the Air Force is going to find itself much shorter in engineers.

APPENDIX D

RESPONSES TO OPEN-ENDED SURVEY QUESTION Q.36
LEAST IMPORTANT CAPTAIN POSITION

WHAT AUTHORIZED CAPTAIN POSITION DO YOU CONSIDER THE LEAST IMPORTANT IN YOUR ORGANIZATION? WHY? (Q.36)

Construction Management because I have a strong Civilian Chief in that section and very capable Civilian personnel working for him. However, when the captain slot is filled the section is enhanced a great deal. Tough question since all my officer authorizations are important, especially to Prime BEEF.

An engineer slot in DEE. In my two years of DE work, I have never seen a captain in design.

None. Each is important on its own merit.

The Chief of Environmental Planning because we have a highly qualified Community Planner who manages the entire environmental program. He is currently working solo because the position of Chief is vacant. I left that slot to become BCE.

Only have one. (Readiness and Logistics)

DEE because I can hire civilians to design projects.

Squadron Section Commander because I have a 2nd Lieutenant with prior service who would be hard to match with any Captain.

I have two captain authorizations, Chief of Construction Management and Chief of Readiness and Logistics. Both are vital to my operation due to a $50,000,000 work load in Construction Management and the importance of Readiness and Prime BEEF.

DEI--Expertise and involvement.

None. Manpower authorizations are the level required to do the job.

Mechanical Engineer Captain. I have one civilian Mechanical Engineer and can contract AE support if a shortage exists. Captain positions in DEEV, DEMR, DEMRL, DEI are more important because there is little or no Civil Engineering.

Squadron Section Commander. It should be a major authorization.

An architect position in DEE. I have two captain, 5525A, authorized. The other captains position could be better utilized in a one deep officer area such as DEI.

Mechanical or electrical engineer. Positions can be covered by civilian personnel or contracted out.

I would say Industrial Engineering, but only because I have an exceptional individual. However, the additional experience in career field would greatly reduce the time and effort he currently expends for problem solving. This is the only authorized captain positions.

Readiness and Logistics; it can be filled with a lieutenant.

Chief of Resources and Requirements. He works close enough with Operations Chief that qualified lieutenants can do an outstanding job.

DEA--Can be filled with good 1st Lieutenant.

Any design engineer AFSC where I am two deep.

DEEE (Design) because senior civilians can help lieutenants in design.

Industrial Engineering because the only other one is Resources and Requirements. The organization can survive without the Industrial Engineer. However, it will not do as well and other officers will pick up the slack.

5525C Design Engineer--Civilian support is available for lieutenants.

One captain position in Engineering Design. The grade isn't essential. Our lieutenants do a super job of project design.

Executive Support Officer. It is the easiest to learn.

Chief Administration Section. The branch is small and not complex. A sharp motivated 1st Lieutenant with a good Chief Clerk and less turnover in civilian workers can do an outstanding job. A captain in Admin will be the Base DA, at least for the past ten year history.

Chief--Engineering Design. Competent civilian assigned.

Deferred--Will never get it.

DEE. A new officer assigned to DEE is basically using his engineering background to gain experience in that specific discipline. Therefore, my civilian engineers are there to help him. My lieutenants are able to make the transition from civilian to military life better within their branch.

IE. This position has no wartime requirement as far as mobility is concerned. While a supervisory position, it does not gain experience in O&M or related skills needed for deployment or recovery.

DEA--Can be administered by lower rank or senior enlisted.

Squadron Section Commander. I do most of the Commander actions anyway.

Chief, Readiness and Logistics. This job can be adequately performed by a senior NCO--grades E-7 through E-9.

Inappropriate question.

Both DEM and DEE are captain positions and both are required. The DEE position should be a major position. The DEM position is least important and could be filled by a 1st lieutenant. The BCE position is a Lt Col position.

DEE. This is a good place for a new engineer to begin.

All captain authorizations are equally important to this organization.

DEI--Workload is down, no QC function.

I have one authorized in the Readiness and Logistics section which could easily be a lieutenant because lieutenants have historically filled the slot and have proven that they can do the job.

Administrative Officer. Since the size of our administrative function in our organization is small, an agressive 1st lieutenant can perform these duties with no problem. The 1st lieutenant filling this position now is also our Prime BEEF officer and he is doing a fantastic job!

Architect.

Squadron Section Commander. I have a very good 1st lieutenant who will soon make captain.

DEMR&R. Ideal training position for new lieutenants if you assign him some superior NCOs. I recognize that not all lieutenants have the maturity to handle this position, but those who do enjoy the job much more than an engineering design position.

702X in DEA. A lieutenant can do the job unless you have a Squadron Section Commander.

Readiness and Logistics. I feel a lieutenant with high ranking NCO support, could adequately handle the job. The technical requirements of the job are not that complex . . . a lieutenant could do it.

DEE. The DEM position requires more independent decisions, greater experience (especially in leading people), greater ability to "negotiate" with officers of other staff agencies. I would be swamped with many minor decisions if I didn't have a capable DEM. DEE decisions are more drawn out, better staffed at the management level, including the FB.

None--they are all important.

One of the Engineering & Planning captains--As a project design engineer doesn't need the overall CE background and experience.

A 5525C position in DEE. I have a total of three 5525C positions--one is filled with a 2nd lieutenant (who happens to have four years experience as a working civil engineer prior to entering active duty). He is good and makes up for part of the vacancies.

DEI. I question the need for this function. Believe it should be reorganized to absorb more responsibility.

With one captain authorized, it is extremely important to consider him essential to our organization.

I consider them all important. One is a Squadron Section Commander who doubles as an Admin/Exec Officer, one is Chief, Construction Management and the third is Chief, Readiness and Logistics.

Industrial Engineer because the IE function is no longer a luxury we can afford and because they are generally used in lieu of requiring middle managers to solve their own problems.

One of the captains in Environmental Planning and Contract Programming. Good training ground for lieutenants.

Only have one.

None.

An engineer position in DEE. The shortage can be overcome by using 2nd lieutenants in the position and supplementing with A/E funds.

COBs (Co-located Operating Base) officer.

5525G general engineer in 420.

DEE. Assigned lieutenants have performed very well. This base has a nucleus of experienced, long term civilian engineers that provide expert guidance and instruction as well as design work.

None. They are all important. All these positions require the experience of captains.

I do not consider any of my captains positions less important than the others. They're all important and I've been trying to increase our manning authorization.

DEI--Work can be done by a "sharp" lieutenant.

Bad question.

The 5525C authorized in Engineering Technical Design. We have organized with a civilian design chief and are fortunate to have extremely competent civilian back up. Therefore, the captain is called upon for little additional beyond the lieutenant design engineers. The slot does function as one two CF-1 team chiefs.

None. All of my officers, especially the engineers, are important to the organization because of world-wide mobility commitment and the need to boost up the Air Force engineering officer corps.

DEI. Have qualified civilians to back up the positions.

None.

None. All are important.

They are all important, however, my captain-design engineer positions have less impact on day-to-day operations.

Environmental & Contract Planning. The job should be civilian for continuity. Otherwise, a lieutenant would be satisfactory.

Environmental and Planning Section. We have an experienced civilian in this area to provide technical assistance.

Chief of Design because I have a lead engineer that can handle it.

I only have one captain position and I consider it significant.

5525A in Tech/Design--Have civilian architect authorization could better use 5525C.

The civil engineer position in design could as well be a lieutenant, since all other slots are lieutenants.

Chief of Construction Management.

Only have one.

Construction Management--This position although vital to our operation has been a training ground for lieutenants. I have a strong branch which carries their own. I'm at present trying to convert this position to a GS-11 civilian for the continuity.

Hard choice--both critical.

Resources and Requirements. We are in a major upgrade program with the lions share (26 percent) of the total future MAL Military Construction Program. This tremendous effort will continue the present extraordinary management for my other two captains.

DEE (One of Design Engineers). Sufficient supervision and expertise is available to provide guidance and training. It should be pointed out that inexperience will impact on design schedules.

I only have two authorized captain positions and I consider them both equally necessary.

Operations. This small base does not need a captain or other officer in this position. Duties and responsibilities require a senior NCO who can perform the work better because of experience and broad CE knowledge.

# APPENDIX E

## RESPONSES TO OPEN-ENDED SURVEY QUESTION Q.37
## MOST IMPORTANT CAPTAIN POSITION

WHAT AUTHORIZED CAPTAIN POSITION DO YOU CONSIDER THE MOST IMPORTANT? WHY? (Q.37)

Chief of Readiness and Logistics. Controls extremely important Material Control, Readiness and Prime BEEF units.

Chief of Readiness and Logistics. Experience is needed in getting the supplies needed.

Chief, Resources and Requirements because of the amount of work involved and number of personnel supervised.

Only have one, Readiness and Logistics.

DEM

Engineering Officers in DEE (Design). I need experience and civilian engineers are impossible to retain because of the lucrative offers from civilian industry. Military officers must take up the slack and provide quality control.

Construction Management, but DEA is a close second.

DEMR. This is the center of in-house effort. All work requests are received, developed, and executed through coordination by this section. A mature individual is required.

DEI--It is the lowest grade that provides the time in service to development of the proper background to be a good management consultant.

The Readiness and Logistics Chief slot. It is the only supervisory captain's slot in the squadron and with the importance of Readiness today, a key position.

Resources and Requirements. Bulk of work controlled by this individual.

Only have one position; Industrial Engineer.

Chief of Resources and Requirements. It is the heart of the CE operation.

Design Chief. Provides experience, motivation and maturity to help season recent active duty engineers.

Engineering--Design judgement followed by DEI.

Industrial Engineer--His studies assist greatly in solving both SGD and Base problem areas.

DEM.

Chief, Resources and Requirements. This function is the heart of the organization. If it doesn't function well, the organization will fall apart.

Chief, Resources and Requirements. Controls majority of the work.

The captain position which supervises Contract Management. The reason is that the person has great technical and significant supervisory responsibility.

Mechanical Engineer. I have no civilian authorization for back up.

Chief, Industrial Engineering Branch - (1) Only officer in branch, (2) Three distinctly different sections with minimum manning (and authorizations), no back up, (3) Cost records vital in reimbursements, manpower applications, etc., and (4) Use or abuse of BEAMS products.

Chief of Resources and Requirements. It's the hub of all in-house activities.

DEMRL. The buck stops there, as far as DEM Ops.

DEI. I need someone with experience to run this branch properly and someone with maturity and experience who can objectively help me fine tune management progress in CE.

Readiness and Logistics. Diversity of function, mobility requirements, develops Ops plans, has contact with troops and has the responsibility of materials and vehicles. A key O&M position.

Resources and Requirements--critical to operations.

Chief, Readiness and Logistics. Readiness is our mission Now!

Chief, Resources and Requirements. This position is responsible for a wide variety of detailed requirements including the Production Control processes. A weakness in the R&R slot tends to over burden the Operations Chief--and the BCE.

DEE since it requires the most experience.

DEI--Has Branch Chief responsibilities therefore, requires more maturity.

Chief of Resources and Requirements--the need for an individual who has a broad background in Civil Engineering.

Chief of Logistics because of work and management involved in Prime BEEF program.

DEI--need the experience.

Chief of Design--DEE. Can't employ qualified civilians.

Chief of Readiness and Logistics because of the increased emphasis of Prime BEEF and the material control function a strong R&L officer is essential. We currently have no one assigned to this position.

Squadron Section Commander.

Chief of Resources and Requirements and Chief of Design. On their shoulders rests the major CE responsibilities for work/project accomplishment.

Architect--need experience.

Engineer positions in Missle Engineering Branch.

Engineering and Environmental Planning. It is the heart of the Contract Programming operation and all Environmental assessments, master planning, etc. It is a big job, which requires strong leadership and management ability.

DEM.

Chief of Engineering Design--workload an important by product to base O&M.

Chief of Engineering Design--To crank out good design projects--keep the civilian engineers going.

Executive Officer. I have a 2nd lieutenant as my executive and it's tough! An experienced executive would certainly help the squadron run smoother.

R&R. This complex management position is the heart of CE organization. I have a junior captain in the position with challenges enough for a major.

DEE--In my absence he sits in my position.

Chief of Readiness and Logistics. The position is a major factor in controlling a 500+ work force and providing for Readiness and Disaster Preparedness.

Environmental Planning--because of the impact on the base.

Chief of Readiness & Logistics. This area must have the most emphasis if the readiness posture is to be achieved and maintained. It is also the easiest area in CE to neglect and needs an aggressive captain to keep it on the track.

Only have one.

Industrial Engineer.

The Chief of Design in DEE--Without a supervisor to establish design schedules and over see the entire design effort the contract program suffers greatly.

O&M--amount of funding available for use.

Architect--most of the engineering requirements fall in the area of general or civil and it is important to have someone who can visualize the effects.

Yes. A captain is necessary to provide help with military and administrative matters that would allow me to do more civil engineering work.

Chief of Readiness & Logistics--need experience to deal with Material Control, Vehicle Control and Prime BEEF.

All others are equally important. To work in DEE/DEM you need experience most lieutenants don't have.

Bad question.

The Executive Support Officer--A7024 overall, but closely followed by the 5525G Chief of Readiness and Logistics. Both are key positions requiring experience and maturity.

Construction Management because of the large numbers (over 70) of projects and great dollar value of over $6 million excluding MCP, AFCOMS, Hospital. In total, we have over 12 million. Additionally, I hope to have more MFH, P-713 and P-722 projects awarded before FY 81 ends to the tune of over $6 million.

Section Squadron Commander. The "Key" to the troops.

Chief, Logistics & Readiness. Ideal positions for O-3 to become intricately familiar with O&M problems, particularly those that constantly rise up and bite us.

DEEV--Chief of Environmental Planning because of changing environmental technologies.

Chief Contract Management should be a major or Lt Col authorization. The complex decisions this individual must make on a daily basis far exceed his authorized grade level of captain.

DEEV--Environmental because we are in California.

Chief, Resources & Requirements.

Engineering--a large dollar value of project design must be accomplished in the next two to three years. Experienced engineers will be critical in accomplishment of this work.

Chief of R&R, he handles the programmed work and the materials for it.

Chief of Resources and Requirements. The degree of judgement, maturity and experience required to adequately do the job.

Industrial Engineer, since it requires organizational experience and perspective to analyze managerial situations/problems.

Chief Resources & Requirements--To insure efficient scheduling of men and materials.

The Chief of R&R must be experienced and able to deal strongly with supply and other base units.

Chief of Resources and Requirements. Depth of responsibility, problems, variety, etc. Interface with the rest of the organization, other organizations, etc.

R&R requires close attention to detail, plus analysis capabilities.

DEE--our primary money expenditure is through contract action.

Resources and Requirements--acts in absence of Chief of O&M.

Resources & Requirements. Focal point, decision point.

Captain filling my Chief Engineer position due to the . . . design program underway.

DEE (Contract Management)--needs knowledge and experience for day-to-day dealing with contractors.

Chief, Engineering Contract Management Branch. Responsible for overall project programs development, contract surveillance, environmental planning, etc.

APPENDIX F

RESPONSES TO OPEN-ENDED SURVEY QUESTION Q.38
LEAST IMPORTANT MAJOR POSITION

WHAT AUTHORIZED MAJOR POSITION DO YOU CONSIDER THE LEAST IMPORTANT? WHY? (Q.38)

Only have one--Chief of Resources and Requirements--extremely important.

Only have one.

Only have one--Chief of Operations.

We only have one authorization--BCE.

Only have one, Resources and Requirements.

I don't think we have enough O-4 positions authorized and I can't consider any one less important than another. They're all needed! (DEMR, DEEE, DEEC, DEEV, are my recommendations)

Only have one--position is important.

None.

Only have one in DEM and it is critical.

The Resources and Requirements positions. Only because I only have two authorized and the other one is the DEM Chief.

None. The two authorized positions Chiefs of Operations and Resources and Requirements, are vital to Civil Engineering's work accomplishment.

I only have one, Chief of Operations.

Only one major authorized and the position is indispensable.

R&R--Can be filled with good captain.

Only have one.

Only authorized one.

There is only one Major authorized.

Only one major.

None, only one authorized and I consider the position very important.

Chief, Resources and Requirements only because experience required to be Chief of Operations is greater.

Chief, R&R (I do not really consider unimportant, only least). (1) Works for another major, Chief of Operations, (2) Level of effort superbly handled by experienced captain, and (3) Volume of work and level of decision.

Only one major authorized.

Need a major in DEMR.

Only have one.

None.

My answer really is all three are very important and I need all. If you must have an answer, I could best do without Off Base Civil Engineering, Chief, Engineering Management.

We only have one major position authorized which is the Chief of Operations, and is a very valid requirement.

No major positions.

Only have one.

Only one.

Chief of Resources and Requirements. Of the two major positions this is the least important, only if it is filled with an experienced captain. R&R and Ops Chief a very important position in Civil Engineering that requires experienced personnel.

Resources and Requirements. An experienced captain would suffice.

Both DEE and DEM are authorized as majors and are filled by majors--both are equally important.

None--I have only one.

R&R--More important in DEM (Chief of Ops)--otherwise it's important.

In any case, with two Civil Engineering squadrons, and a total of two majors, both are essential. If I'm forced to choose, the Engineering Chief of Design is least important because of civilian engineering back up and a civilian Chief of Engineers positions.

Only one major position.

Two majors--both are equally important.

Only have one in DEMR.

Chief of R & R--I only have one authorization.

DEE--this is a very demanding position requiring highly qualified major however, I had to make a choice and Ops is just a tougher job.

I only have one.

Only have one.

Only one major authorized.

Only have one.

None.

I only have one--Chief of R&R and I consider it very important.

DEI--No majors are available to fill such positions and the rank is not as important as the expertise.

DEI. An experienced captain backed up by our staff of experienced civilian and military technicians is sufficient for our workload.

No authorizations.

We do not have any major positions. However, I have been trying to get a major's authorization in DEE so he can act in my stead when I am not available. So far, no luck!

All important--they are both branch chiefs.

Bad question.

Only one major authorized.

None.

None.

None--both are important.

Only have one!

None. We only have one, Chief of Operations. It's important to have experience here.

Chief of Operations, because the superintendents are available for back up.

As Detachment Commander, my position is the only major position and it is critical to accomplish the RED HORSE mission.

Chief of Engineering. The major authorization in Operations is more important.

Resources and Requirements--Good captain with experience/initiative can handle it. (Just not too many good captains around . . .)

Only have one authorization for major, Chief of Operations.

Have two of equal importance.

CCQ, major is not required. A captain is fine.

DE is the only major.

DEA--I have a very strong 1st Shirt/Admin Area.

Chief of Operations--only because I've been lucky with two outstanding senior captains holding the position.

Only one major position.

I have only one authorized major position and I think it is extremely important. The position of R&R is most important. I have a junior captain in that position and he is doing an outstanding job.

Only one authorized, the BCE position.

APPENDIX G

RESPONSES TO OPEN-ENDED SURVEY QUESTION Q.39
MOST IMPORTANT MAJOR POSITION

WHAT AUTHORIZED MAJOR POSITION DO YOU CONSIDER THE MOST IMPORTANT? WHY? (Q.39)

Chief of Resources and Requirements--need the experienced officer to make the decisions on work scheduling, funding and manpower.

One have one, R&R.

DEM.

Only have one.

Chief of Operations.

Chief of Operations. Next step to command position.

DEM. This position has a great responsibility, that of directing the entire in-house work effort.

Chief, Resources and Requirements--It's the only one I have!

The DEM Chief.

Chief of Maintenance--only one authorization and is major contact with public.

Chief of Operations. A good, qualified and experienced major is vital to the direction of work forces and the management of resources. He must be fully qualified in supply field, transportation, personnel plus complete knowledge of engineering trades and a good leader. An inexperienced major in this position can do more harm than good.

Chief of Ops. That is where the action is.

Chief of Operations has rank and experience to deal with other organizations on equality basis. Has ability to handle union problems and civilian personnel problems.

DEEE--Judgement and leadership for new lieutenants in DEEE and there will always be some.

Only have one.

Chief of R&R.

Chief, Operations--It is the number two position in this squadron. He controls 80 percent of the people and the most visible service to the customer.

Chief of Operations. Need experience, leadership in this critical position.

Chief, Resources and Requirements. The person manages our whole work requirements process.

Chief of Operations--Toughest job in CE. Rank is important in dealing with others in and out of the organization.

Chief, Ops Branch--(1) Back up for BCE as SQD commander, (2) Responsible for efforts of almost two hundred military and civilians, (3) Often has direct interface with senior commanders, and (4) Requires knowledge of production control, shop ops, and readiness.

Only have one major authorization.

Would be nice to have a major or Lt Col in DEEC.

DEM--you need someone who has had CE operation experience. In addition, if he has a broad base of CE experience in other branches, he can do the job better.

R&R, good training for O&M Chief position.

DEM.

Chief, Off Base Civil Engineering. He is working the load of a Lt Col plus needs the experience and rank high enough to deal with the many problems of supporting all off base sites in Alaska.

Chief of Operations. This position is the key to the successful management of daily maintenance requirements as well as forecasting long term requirements. This job is best managed by an individual with considerable experience in the BCE area of concern.

No major positions.

R&R--critical to back up Chief of Ops, also this is where the "guts" of support to shops is really at.

DEEE--need the experience.

Only one.

Chief of Operations.

Chief of O&M--controls over six hundred personnel.

DEM especially if superintendents are weak. The majority of the base O/M is his responsibility. It's the part seen by the VIPs and that which directly effects most people on base--source of morale problems.

Chief, R&R--level of contacts base wide. Particularly important on a large base with a NAF or higher tenant.

Chief of Ops--that's where the action is.

The Chief of Operations. Many military and civilians to lead and manage and a complex, fast moving, ever changing job to contend with. It takes an experienced person.

The one in DEMR.

Chief of Resources and Requirements--I only have one authorization.

DEM.

I only have one.

DEMR--only one I have, but I don't think a major is required for an R&R position. A senior captain would do fine.

Chief of Operations. Magnitude of responsibility in terms of manpower and resources. Senior officer needed to command senior NCOs in the Operation Branch.

Only have one.

Chief of R&R. Key player with very difficult job.

R&R--Although not currently a major, it will be--needs to make key decisions about committing Civil Engineering effort.

DEM. This could even be a Lt Col position. The responsibility is awesome--especially during the winter months when we have continued snow and ice removal problems as well as heating and other problems.

All are important.

Bad Question.

Only one authorized--Resources and Requirements--this is the hub of the planning, scheduling and coordinating the day-to-day maintenance and repair activities. It requires experience in a multitude of diverse areas.

Chief of Resources and Requirements, only major authorization. Officer must be experienced, resourceful, an astute manager of resources, customer oriented, and have the initiative to come up with ideas of keeping track with all the work orders and job orders in the system. An experienced senior captain can do this job, but if you get "lemon" just to fill the square, I'm in trouble.

Director of Engineering and Environmental Planning . . . is embarking on a $20 million modernization program and position must be filled with O-5. Currently he manages three each GS-13 supervisor/engineers.

DEM--most visible supervisory position in CES. DEM makes or breaks BCE functions at base level.

Chief, Resources and Requirements. Daily required to make decisions involving expenditure of thousands of dollars.

Chief of Operations.

Chief of Engineering and Environmental Planning because contract work and master planning are so important.

Chief of Operations--the leadership, management and judgement skills required.

Chief of Ops--need experience, judgement, and ability to deal with other base agencies.

Chief of Ops--numerous daily management decisions necessary for base support.

Have two of equal importance. Could not do without either.

Chief of Operations. Scope of responsibility, number of people supervised, interface with other organizations, etc.

DEM and DEE--The scope of work at this base is probably the largest in the Air Force. Five thousand housing units, joint support, international projects, fifteen hundred man squadron.

DE.

DEM--Total responsibility for operations/maintenance of base--acts as DE in my absence.

My deputy position which is converted to military from GS-13.

DEM (R&R).

The BCE position. Broad CE experience and knowledge needed. BCE expends more than 65 percent of base budget, has wide ranging responsibilities, and must liaison with numerous commanders, tenant organizations, et.al., on base.

# APPENDIX H

## SAMPLE OF SPSS COMPUTER PROGRAM AND DATA

```
100=WMM,CM65300,T10,I020. T810194,WILLIAM M MCDONALD,THESIS
 110=ATTACH,SPSS,ID=AFIT.
 120=SPSS.
 130=*EOR
 140=RUN NAME       CIVIL ENGINEERING OFFICER SHORTAGE
 150=VARIABLE LIST  Q1 TO Q40
 160=VAR LABELS     Q1,  GRADE/
 170=               Q2,  YEARS OF SERVICE/
 180=               Q3,  YEARS IN CE/
 190=               Q4,  BCESO COURSE AT AFIT/
 200=               Q5,  NUMBER OF TOT OFF AUTHORIZATIONS/
 210=               Q6,  NUMBER OF CPT AUTHORIZATIONS/
 220=               Q7,  NUMBER OF CAPT AUTHOR FILLED BY CAPT/
 230=               Q8,  NUMBER OF CAPT AUTHOR FILLED BY BELOW/
 240=               Q9,  NUMBER OF MAJ AUTHORIZATIONS/
 250=               Q10, NUMBER OF MAJ AUTHOR FILLED BY MAJ/
 260=               Q11, NUMBER OF MAJ AUTHOR FILLED BY BELOW/
 270=               Q12, NUMBER OF MAJ AUTHOR FILLED BY LT/
 280=               Q13, BRANCH IMPACTED MOST BY MAJ SHRTG/
 290=               Q14, BRANCH IMPACTED LEAST BY MAJ SHRTG/
 300=               Q15, BRANCH IMPACTED MOST BY CPT SHRTG/
 310=               Q16, BRANCH IMPACTED LEAST BY CPT SHRTG/
 320=               Q17, AUTHOR RANK OF CHIEF RR/
 330=               Q18, ASSGN RANK OF CHIEF RR/
 340=               Q19, MAINT APPRVL AUTHRTY OF CHIEF RR/
 350=               Q20, REPAIR APPRVL AUTHRTY OF CHIEF RR/
 360=               Q21, MINOR CNSTR AUTHORITY OF CHIEF RR/
 370=               Q22, AUTHOR RANK OF CHIEF OPS/
 380=               Q23, ASSGN RANK OF CHIEF OPS/
 390=               Q24, APPRVL AUTHORITY OF CHIEF OPS/
 400=               Q25, MINOR CNSTR AUTHORITY OF CHIEF OPS/
 410=               Q26, NEXT LOWER RANKING OFFICER/
 420=               Q27, BCE MAINT APPRVL AUTHORITY/
 430=               Q28, BCE REPAIR APPRVL AUTHORITY/
 440=               Q29, BCE MINOR CNSTR APPRVL AUTHORITY/
 450=               Q30, DEI GO DOWN DUE TO SHRTG/
 460=               Q31, LTS DOING WELL/
 470=               Q32, SHRTG INCREASE DECISIONS BY BCE/
 480=               Q33, STRESS ON LOW RANK OFFICERS/
 490=               Q34, LOW LEVEL OF CE ACTVTS DUE TO SHRTG/
 500=               Q35, LOW QUALITY OF CE ACTVTS DUE TO SHRTG/
 510=               Q36, CAPT CONSIDERED LEAST/
 520=               Q37, CAPT CONSIDERED MOST/
 530=               Q38, MAJOR CONSIDERED LEAST/
 540=               Q39,MAJOR CONSIDERED MOST/
 550=               Q40, CONUS OR OVERSEAS/
 560=INPUT FORMAT   FIXED (40(1A1))
 570=INPUT MEDIUM   CARD
 580=COMMENT        FILL IN NUMBER OF CASES
 590=N OF CASES     91
 600=RECODE         Q1 TO Q40 ('A'=1) ('B'=2) ('C'=3) ('D'=4) ('E'=5)
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610=              ('F'=6) ('G'=7) ('H'=8) ('I'=9) ('J'=10) ('K'=11)
620=              ('L'=12) ('M'=13) (' '=0)
630=VALUE LABELS  Q1 (1)COLONEL (2)LT COLONEL
640=              (3)MAJOR (4)CAPTAIN/
650=              Q2 (1)8 YEARS BLT 12 YEARS
660=              (2)12 YEARS BLT 16 YEARS
670=              (3)16 YEARS BLT 20 YEARS
680=              (4)20 YEARS BLT 24 YEARS
690=              (5)24 YEARS BLT 28 YEARS
700=              (6)OVER 28 YEARS/
710=              Q3 (1)LESS THAN 5 YEARS
720=              (2)5 YEARS BLT 10 YEARS
730=              (3)10 YEARS BLT 15 YEARS
740=              (4)OVER 15 YEARS/
750=              Q4 (1)YES (2)NO (3)WILL ATTND WITHIN NXT 6 MTHS/
760=              Q5 (1)LESS THAN 5 OFFICERS
770=              (2)5 OFFICERS BLT 10 OFFICERS
780=              (3)10 OFFICERS BLT 15 OFFICERS
790=              (4)15 OFFICERS BLT 20 OFFICERS
800=              (5)20 OFFICERS BLT 25 OFFICERS
810=              (6)OVER 25 OFFICERS/
820=              Q6 (1)1 (2)2 (3)3 (4)4 (5)5 (6)6 (7)7 (8)8 (9)9
830=              (10)10 (11)11 (12)12 (13)13 (0)NO IMPACT/
840=              Q7 TO Q11 (1)1 (2)2 (3)3 (4)4 (5)5
850=              (6)OVER 5 (0)ZERO/
860=              Q12 (1)1 (2)2 (3)3 (4)4 (5)5 (6)ZERO/
870=              Q13 (1)DEA (2)DEE (3)DEF (4)DEH (5)DEI
880=              (6)DEM (7)OTHER (0)NO IMPACT/
890=              Q14 (1)DEA (2)DEE (3)DEI (4)DEM(5)OTHER
900=              (0)NO IMPACT/
910=              Q15 (1)DEA (2)DEE (3)DEF (4)DEH (5)DEI
920=              (6)DEM (7)OTHER (0)NO IMPACT/
930=              Q16 (1)DEA (2)DEE (3)DEI (4)DEM
940=              (5)OTHER (0)NO IMPACT/
950=              Q17 (1)SCND LT (2)FRST LT (3)CPT (4)MAJ
960=              (5)NCO (6)CIVILIAN/
970=              Q18 (1)SCND LT (2)FRST LT (3)CPT (4)MAJ
980=              (5)NCO (6)CIVILIAN/
990=              Q19 (1)400,000 OR LESS (2)300,000 OR LESS
1000=             (3)200,000 OR LESS (4)100,000 OR LESS
1010=             (5)50,000 OR LESS/
1020=             Q20 (1)400,000 OR LESS (2)300,000 OR LESS
1030=             (3)200,000 OR LESS (4)100,000 OR LESS
1340=             (5)50,000 OR LESS/
1050=             Q21 (1)LESS THAN 5,000 (2)5,000 BLT 10,000
1060=             (3)10,000 BLT 15,000 (4)OVER 15,000/
1070=             Q22 (1)SCND LT (2)FRST LT (3)CPT (4)MAJ
1080=             (5)LT COLONEL (6)NCO (7)CIVILIAN/
1090=             Q23 (1)SCND LT (2)FRST LT (3)CPT (4)MAJ
1100=             (5)LT COLONEL (6)NCO (7)CIVILIAN/
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110=              Q24 (1)YES (2)NO/
1100=              Q25 (1)LESS THAN 5,000 (2)5,000 BLT 10,000
1100=              (3)10,000 BLT 15,000 (4)15,000 BLT 25,000
1140=              (5)CHIEF OPS HAS NO APPRVL AUTHORITY/
1150=              Q26 (1)COLONEL (2)LT COLONEL (3)MAJ
1160=              (4)CPT (5)FRST LT (6)SCND LT/
1170=              Q27 (1)500,000 OR LESS (2)400,000 OR LESS
1180=              (3)300,000 OR LESS (4)200,000 OR LESS
1190=              (5)100,000 OR LESS/
1200=              Q28 (1)400,000 OR LESS (2)300,000 OR LESS
1210=              (3)200,000 OR LESS (4)100,000 OR LESS
1220=              (5)50,000 OR LESS/
1230=              Q29 (1)LESS THAN 5,000 (2)5,000 BLT 10,000
1240=              (3)10,000 BLT 15,000 (4)15,000 BLT 25,000
1250=              (5)GT 25,000/
1260=              Q30 (1)STRONGLY AGREE (2)AGREE
1270=              (3)UNDECIDED (4)DISAGREE (5)STRONGLY DISAGREE/
1280=              Q31 (1)STRONGLY AGREE (2)AGREE
1290=              (3)UNDECIDED (4)DISAGREE (5)STRONGLY DISAGREE/
1300=              Q32 (1)STRONGLY AGREE (2)AGREE
1310=              (3)UNDECIDED (4)DISAGREE (5)STRONGLY DISAGREE/
1320=              Q33 (1)STRONGLY AGREE (2)AGREE
1330=              (3)UNDECIDED (4)DISAGREE (5)STRONGLY DISAGREE/
1340=              Q34 (1)STRONGLY AGREE (2)AGREE
1350=              (3)UNDECIDED (4)DISAGREE (5)STRONGLY DISAGREE/
1360=              Q35 (1)STRONGLY AGREE (2)AGREE
1370=              (3)UNDECIDED (4)DISAGREE (5)STRONGLY DISAGREE/
1380=              Q36 (0)ZERO (1)DEA (2)DEE (3)DEEC (4)DEEE (5)DEEV
1390=              (6)DEI (7)DEM (8)DEMR (9)DEMRL (10)OTHER/
1400=              Q37 (0)ZERO (1)DEA (2)DEE (3)DEEC (4)DEEE (5)DEEV
1410=              (6)DEI (7)DEM (8)DEMR (9)DEMRL (10)OTHER/
1420=              Q38 (0)ZERO (1)DEE (2)DEI (3)DEMR (4)OTHER/
1430=              Q39 (0)ZERO (1)DEE (2)DEEC (3)DEEE (4)DEM (5)DEMR
1440=              (6)OTHER/
1450=              Q40 (1)CONUS (2)OVERSEAS/
1460=FREQUENCIES   GENERAL=Q1 TO Q5,Q40
1470=OPTIONS       8
1480=STATISTICS    ALL
1490=COMMENT       PLACE THE DATA AFTER THE READ INPUT CARD
1500=READ INPUT DATA
1510=AFDACEADAACF FEBDDDDAEEAABCCEBABDDDCIC A     1
1520=AFCADJBFA AAFAFBDBEEAEDAACCCABBBBDEBI EA     2
1530=BCDACF FAA F ABAFFEEADDABCEECDABDDB    A     3
1540=DAACBCAAA AF DEDCCEEACCDEDEEABBADCDEH  A     4
1550=AEDACA AAA F EFEDDEEAEEABBEDDEBDDDDIICEA     5
1560=AEDACDABCABFFAFBDCEEAEEAEEEDAEDDCDDBC DA     6
1570=BBDADEADBAAFFABCDCEEEEDABCEDCEDAABAAB  A     7
1580=AFDACBAAAA F  B DDEEAEEAABCCEDADEDD C  A     8
1590=AEBACHAFA  F EBCFFEEADEAAEEEDBABCEDFC DA     9
1600=AECACD DB BFFABCDCDEDDCADFDDDEAADDB H DA     10
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610=BCDACFBCAA F  BACCEEADDAACEEBDABDDBB  DA     11
1620=ADBACB BA AFFCBCDCDEAEEAABCCDBBSBDBAF EA     12
1630=BCDBCG FBAAFFABADCEESDDACCEDDBBBDCABICDA     13
1640=BCABCEE AA F  BCCCEEADDAACEEAABAEDDBH DA     14
1650=BCDABAAABAAAFABADAEEADDAACCCDABABAB F DA     15
1660=BDCABFAEAA FFCDACDEEADDAACEDDCBDDDBIH DA     16
1670=BCBCCDACA AFBAFCCAEEADCAADEECAAABCAHD DA     17
1680=BCBADH FB BFBDBADCEEBEDABCEEDCBADBAADCAA     18
1690=BDDBDHECAA FBEBECCEECEEACBABDBBBDCBBF  B     19
1700=AEDABD DA AAFAFADBBBBEEABBCBBACADBBDI EA     20
1710=AEDAABA A AFF   CCEEADCAABDDDABAEBBFH DA     21
1720=BDCACECBA AFF BDCCCDDDGADFDDDCBBDEBDH DA     22
1730=BCDBCHAFA  FFBFCDEEEAEDAACEECDACEEEDC EA     23
1740=BDBCBDACBAAFFCBADCDEADDAACCCBBDABAAADCDA     24
1750=BDDABC CB BAFAEADBEEBDCABDDDDABABDDAFCDA     25
1760=BCCBCC CAA F  FBCBEEADDAACCCDDBABDDDH  A     26
1770=ADDABC A      BCFCEEBEDACBCCDBDDDBB I BA     27
1780=ADDACDBBBBAAAFCFBCCEEBEDABCCBCBCBDDDBF DA     28
1790=AFDACE EA AAFAFCDBEEBEEACBDDDEBADEEFI EA     29
1800=ADAABEABA  F  FACDDEADEAABDDDBADDDDAH DA     30
1810=ADDAFMFFBB F  BCDDEEBEEACBAAEAABDDAAIEFB     31
1820=BDDACFAEAA F ABACCDEDDDADCEEDEABDEAIH DA     32
1830=ADBACLCDBAA BDBDDDEEAEEAABEEAABAEEB   A     33
1840=CBCAABA     BAFAEEEEACCBECEEBBAEEEEGB  B     34
1850=BCDACJAF   FBABAFFEEAEDABCDECEAABBB   A     35
1860=AEAACJAFA AFFABEDCEEAECAEDEDAABDDDBDF  A     36
1870=AEAABDCAA  FFABACCEEAGGAABDDDDBDDDD H  A     37
1880=ADCABB BAA FFCFCDDEEAEEACBEECAEACEAFI EA     38
1890=ADDACD DAA    ADFFEEBEEACBEDDDDEEEEIF CA     39
1900=BCDACCBAA AFFABADCEEAEDBECEDBDBBCDA D  A     40
1910=CCDBBD DBAAFFABADCEEBDDADDDDDDBDDEDAICDA     41
1920=BBCBCCABAA F ABBCCEEADDAACEECBBDDEB   A     42
1930=BBDCCFACB AFFABCCCDEADGAADEECDBADCD3  A     43
1940=ADDACFEBB AFFABADCCDCDEAABCCEDBBBABDACDA     44
1950=BCCBCDCABB F  B CCEEADDABCEECBDBDDBAHADB     45
1960=ADDACC BA A FCBCDCCDDEEADBDDDCAADBAID EA     46
1970=BBCACEBCBAAFFAFCDCEEADDBECEEBABABBBADCDA     47
1980=ADDADIBDBA FBCBAFFEEADDBEEEEDBBABAAIBADA     48
1990=CBCABBAAAA F  BDBAEECCCADDEEDDBBDDDBC  B     49
2000=BCDBCHFBBB F  BDCCDDCDDADCEDDEBDEEE D DB     50
2010=BCDACEBCA AFFAEDDCEECEDACCCDBBBDEDDB EB     51
2023=ADAACC CA AAFEBEDAEEAEDAACCCDDBDDDDDA EA     52
2030=CBCBCEDABB F  A CCEEADDAACDDDDBDDDDFHADB     53
2043=ABDABDAC      BDEEEEAFFBEDEEACBDCCC B  B     54
2053=ADDABCC AA      FFEEBEEBEEEEDDDCCEE I  B     55
2060=ACDACE EA AAFEBEDEEEBEDACCEEDABEDEBFE DA     56
2070=AEAACGDCAA FBA BCCEEADDABCEEDDADEECEI DB     57
2083=DACABAA A AF    BAEEACCAADEEACBDDBC   A     58
2090=AEBABD CA AFFCBADCBBCEDACCBDDABBB2B F EA     59
2100=ADBACFAEA AFFCBCDCCDAEDAACCCBEDBCBBDD EA     60
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100=ADBACFAEA AFFCECDCCDAEDAACCCBEDBCBBDD EA     60
2110=DAABBCC       EACCEEACCBBDEECCCCEEC C  B     61
2120=ADCADEEADACABCFBCCBCAEDBEBCCCDBBABBBJDBEA     62
2130=BCAACC CCABAFCBADCDECDDBECCCDBAABBDDDABDA     63
2140=ADCACHCC     BBAFFEEBEEACBEEDEDDDDB I  A     64
2150=BCDABDC     BA       CCBED  A  EADDBB  B     65
2160=BDBACEADBAAFBDBCCBEEADCAA BBDDBBBED    B
2170=AECACDBBBAAFBDFACCEEADDABCDCDDBBDBB    A     67
2180=ADCADEACA AFF FBDFBCCEEACBCCDEBEEEEDA EA     68
2190=BCDACHAFA AFFABADCEE EDAECBB EDBBDD C EA     69
2200=ADDBBBB     FAFCCCEEEDABBCCDBCADDDFA  B     70
2210=ACDAC   CABFFBECDCEEAEEAABCDE  EEEE I AA     71
2220=AFDABDACBAAAFEBEDAEEADDABCEEDDDBEBB E DA     72
2230=AEAACIBEBAAFBABADBEEAEDAACEECBABEDD C EA     73
2240=ACDACFAFA AFFABADCEEAEDAACCCCEBAEAADE  A     74
2250=CBBCBC CA AFFBEACBDECDCADCEECADADDABH DA     75
2260=ADDBCE EA AABAFAFFEEAEEEEFCCABDBCDAEA  A     76
2270=BCDBBCBABB F  BACCEEBDDABCEEDBCBBDDBHEAB     77
2280=CCCBAA AAA F  B      FFBEE   CACDDC  E B     78
2290=BCDACFDDBAAFBDBDCCEECDDADCEEEEBDDDB HADB     79
2300=BBCACHCDBAAFFBBADCEEADDAACEEDEBBECA FCDB     80
2310=BCDACJBCAA F ABCCAEEADDAACEEDCBBBBCDH DA     81
2320=BBCADFDABB F    CCEEADDAABEEDEDCECCDH  B     82
2330=BCDABCC BB F    CCEEADDAACEED B DDDCHADB     83
2340=AEAACEB CBAF A  CCECADDBABDCADBEEEE HEDB     84
2350=CBCBAAA AA F  BAEEAEBFFABDBEB  DCCC BEFB     85
2360=AFAACEBCBB F ABACCEEBDDABCEEDABBDDDCHEDA     86
2370=BCBACBB AA F A ACCEECEDADCEECDEBDDA H  B     87
2380=BCBADCBAB BFGDBDCC   DCABDEEDBEACBEHDE B     88
2390=ADAACFACA AFF BADCEEBEEACBEEDCBBDDDDC EA     89
2400=ADDACBB A AFFB  DCEEAEDAACCCCBEBCEEE  C A     90
2410=CCDBABB AA FG BAEEEEACFAEDEEACBCDDDGCEF3     91
2420=FREQUENCIES    GENERAL=Q6 TO Q12
2430=OPTIONS        8
2440=STATISTICS     ALL
2450=FREQUENCIES    GENERAL=Q13,Q14,Q38,Q39
  2460=OPTIONS        8
2470=STATISTICS     ALL
2480=FREQUENCIES    GENERAL=Q15,Q16,Q36,Q37
2490=OPTIONS        8
2500=STATISTICS     ALL
2510=FREQUENCIES    GENERAL=Q19,Q20,Q21,Q25
2520=OPTIONS        8
2530=STATISTICS     ALL
2540=FREQUENCIES    GENERAL=Q26 TO Q33,Q32,Q34,Q35
2550=OPTIONS        8
2560=STATISTICS     ALL
2570=CROSSTABS      TABLES=Q1  BY Q26
2580=FREQUENCIES    GENERAL=Q17,Q18,Q22,Q23,Q24
2590=OPTIONS        8
2600=STATISTICS     ALL
..
```

```
610=CROSSTABS      TABLES=Q17 BY Q18
2620=CROSSTABS      TABLES=Q1  BY Q17
2630=CROSSTABS      TABLES=Q1  BY Q18
2640=CROSSTABS      TABLES=Q22 BY Q23
2650=CROSSTABS      TABLES=Q1  BY Q22
2660=CROSSTABS      TABLES=Q1  BY Q23
2670=FREQUENCIES    GENERAL=Q31,Q33,Q35
2680=OPTIONS        8
2690=STATISTICS     ALL
2700=FINISH
2710=*EOR
2720=*EOF
..
```

# APPENDIX I

## SURVEY QUESTIONNAIRE HISTOGRAMS

## NOTES ABOUT APPENDIX I

1. The available responses to the survey questions were alphabetically lettered starting with the letter "a". The letters were converted to a numerical equivalent in order to use the SPSS computer program with a=1, b=2, . . . , z=26, and zero=0. As an example, for question Q.1, the mean of 1.670 corresponds to a mean between a=1 and b=2.

2. There were ninety-one respondents to the survey questionnaire so the bar graphs are scaled only up to ninety responses.

3. Mode--The mode for question Q.1 is shown as mode (a)=48.4%. (a) shows the corresponding answer receiving the greatest amount of responses. The percentage, 48.4%, is the amount of responses to answer (a), which was 44, divided by the 91 total respondents.

Q.1. What is your active duty grade?

(a) Colonel

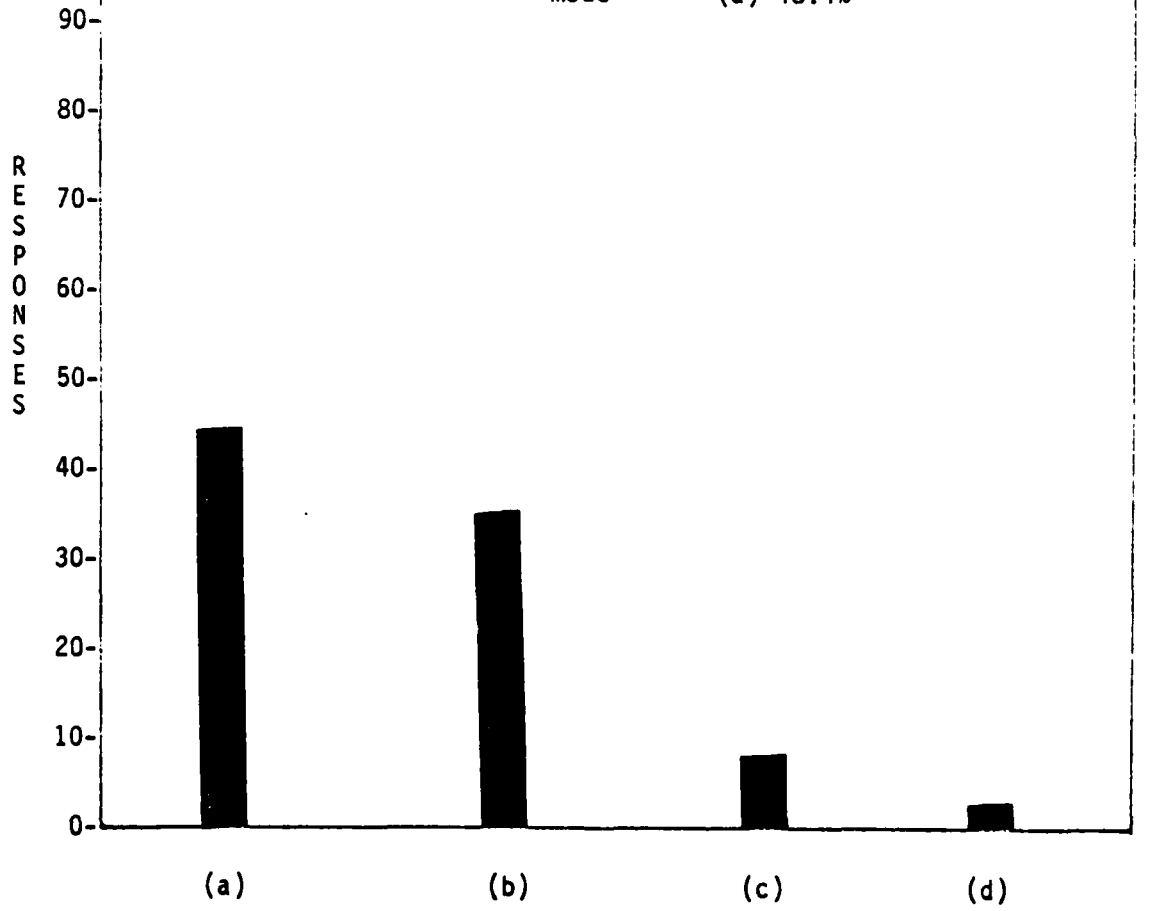
(b) Lieutenant Colonel

(c) Major

(d) Captain

STATISTICS

| | |
|---|---|
| mean | 1.670 |
| std. deviation | .775 |
| mode | (a)=48.4% |



Q.2. How much total active military service do you have?

(a) 8 but less than 12 years

(b) 12 but less than 16 years

(c) 16 but less than 20 years

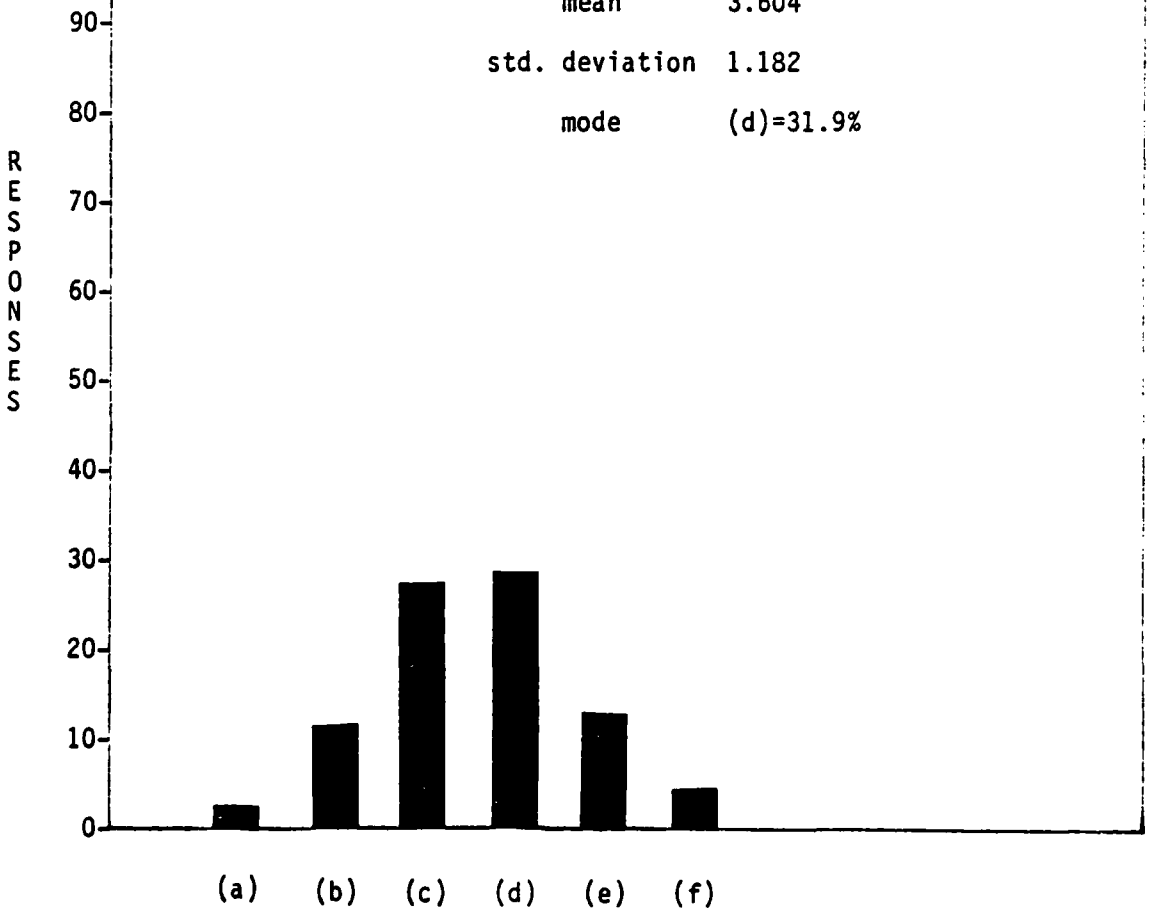
(d) 20 but less than 24 years

(e) 24 but less than 28 years

(f) Over 28 years

STATISTICS

| | |
|---|---|
| mean | 3.604 |
| std. deviation | 1.182 |
| mode | (d)=31.9% |



Q.3. How long have you been in the Civil Engineering Career Field?

(a) less than 5 years

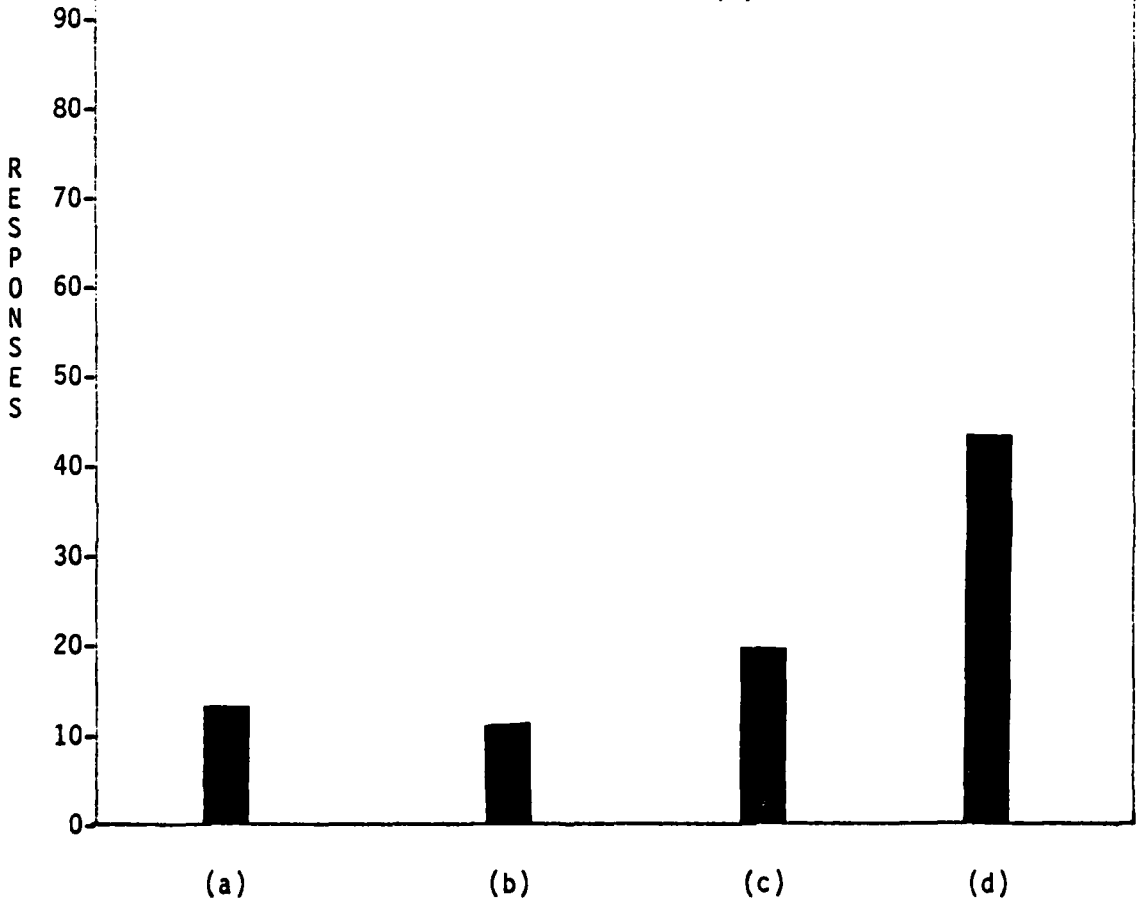
(b) 5 but less than 10 years

(c) 10 but less than 15 years

(d) Over 15 years

STATISTICS

| | |
|---|---|
| mean | 3.077 |
| std. deviation | 1.098 |
| mode | (d)=49.5% |



Q.4. Have you attended the Base Civil Engineering Staff Officers Course at AFIT, Wright-Patterson AFB?

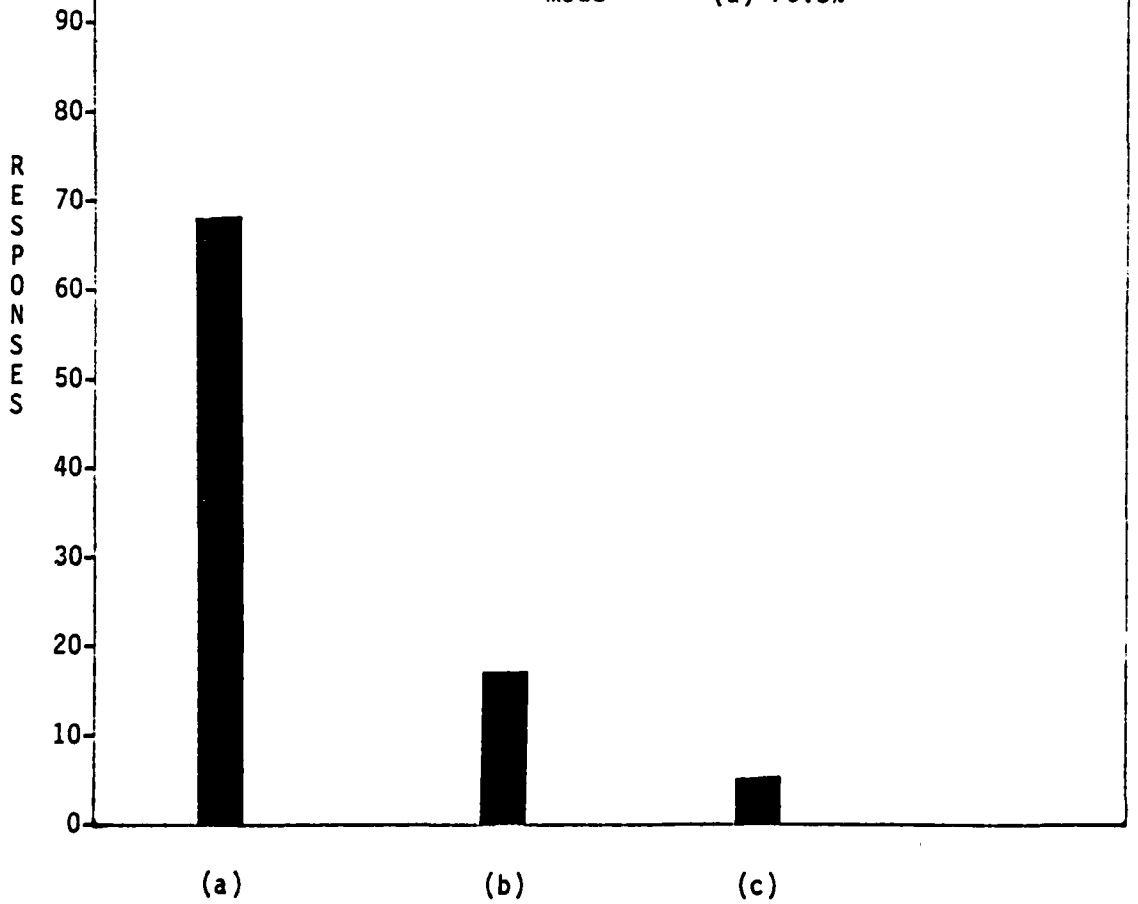
(a) Yes

(b) No

(c) Scheduled to attend within the next 6 months

STATISTICS

| | |
|---|---|
| mean | 1.297 |
| std. deviation | .568 |
| mode | (a)=75.8% |



Q.5. How many officers are authorized in your organization?

(a) Less than 5 officers

(b) 5 but less than 10 officers total

(c) 10 but less than 15 officers total

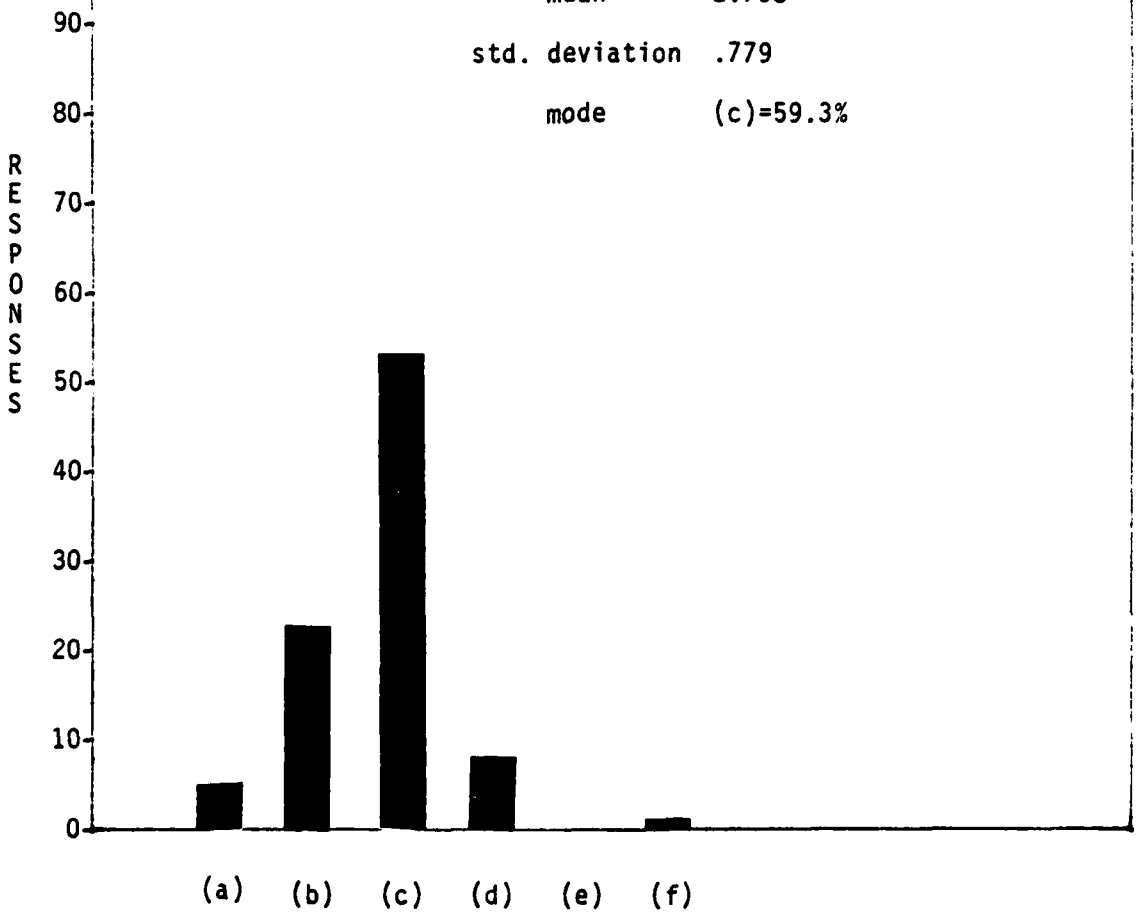
(d) 15 but less than 20 officers total

(e) 20 but less than 25 officers total

(f) Greater than 25 officers

STATISTICS

| | |
|---|---|
| mean | 2.758 |
| std. deviation | .779 |
| mode | (c)=59.3% |

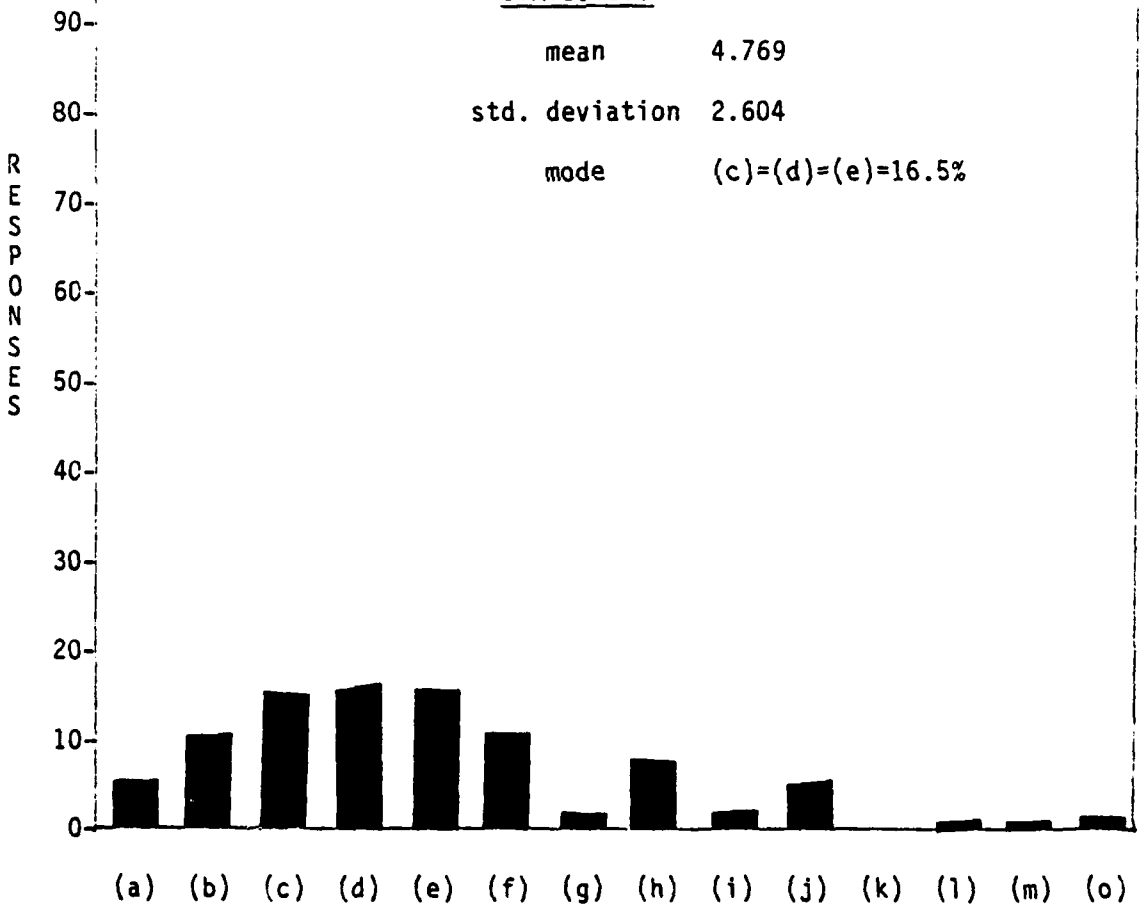


Q.6. How many captains are authorized in your organization?

| | | | |
|---|---|---|---|
| (o) | None | (g) | 7 |
| (a) | 1 | (h) | 8 |
| (b) | 2 | (i) | 9 |
| (c) | 3 | (j) | 10 |
| (d) | 4 | (k) | 11 |
| (e) | 5 | (l) | 12 |
| (f) | 6 | (m) | 13 |

STATISTICS

| | |
|---|---|
| mean | 4.769 |
| std. deviation | 2.604 |
| mode | (c)=(d)=(e)=16.5% |



Q.7. How many of your captain authorizations are filled by captains?

(o) None

(a) 1

(b) 2

(c) 3

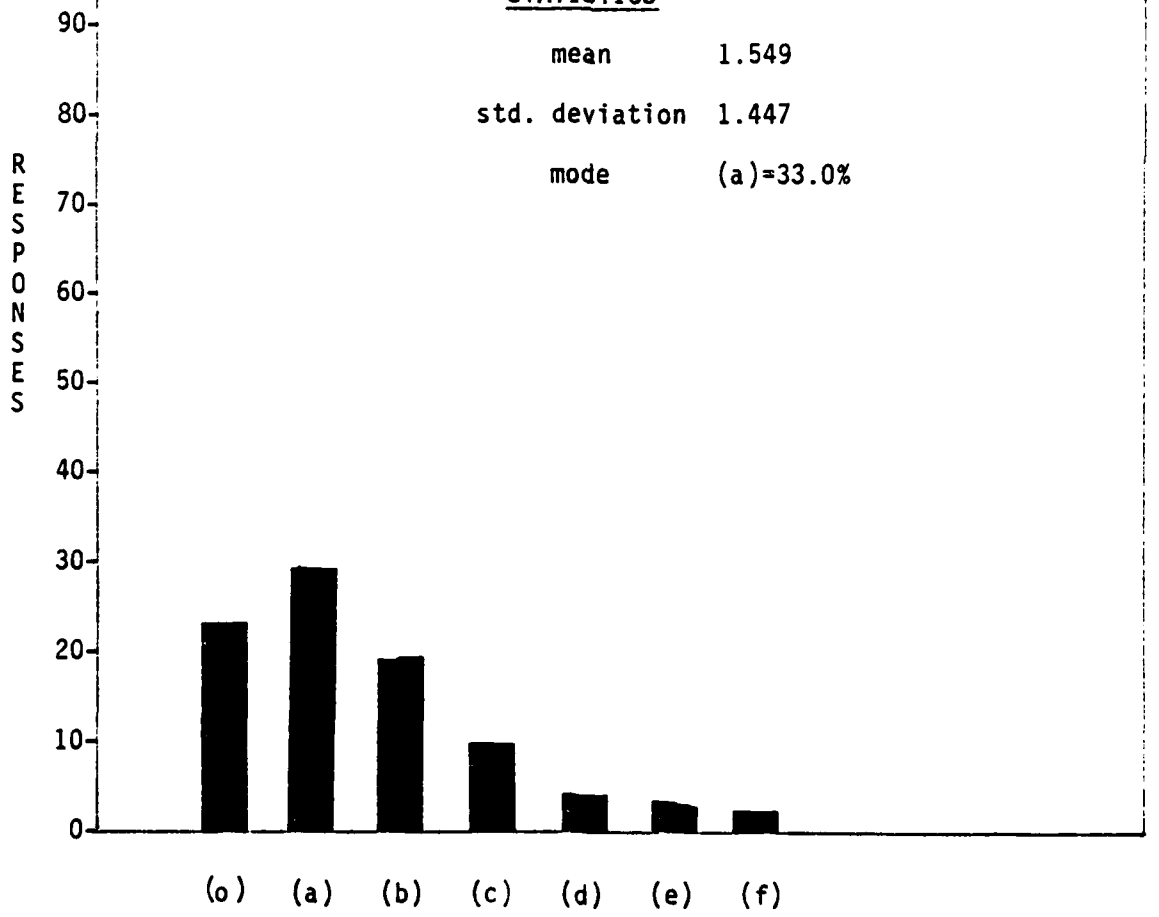
(d) 4

(e) 5

(f) Over 5

STATISTICS

| | |
|---|---|
| mean | 1.549 |
| std. deviation | 1.447 |
| mode | (a)=33.0% |



Q.8. How many of your captain authorizations are filled with officers below the authorized grade?

(o) None

(a) 1

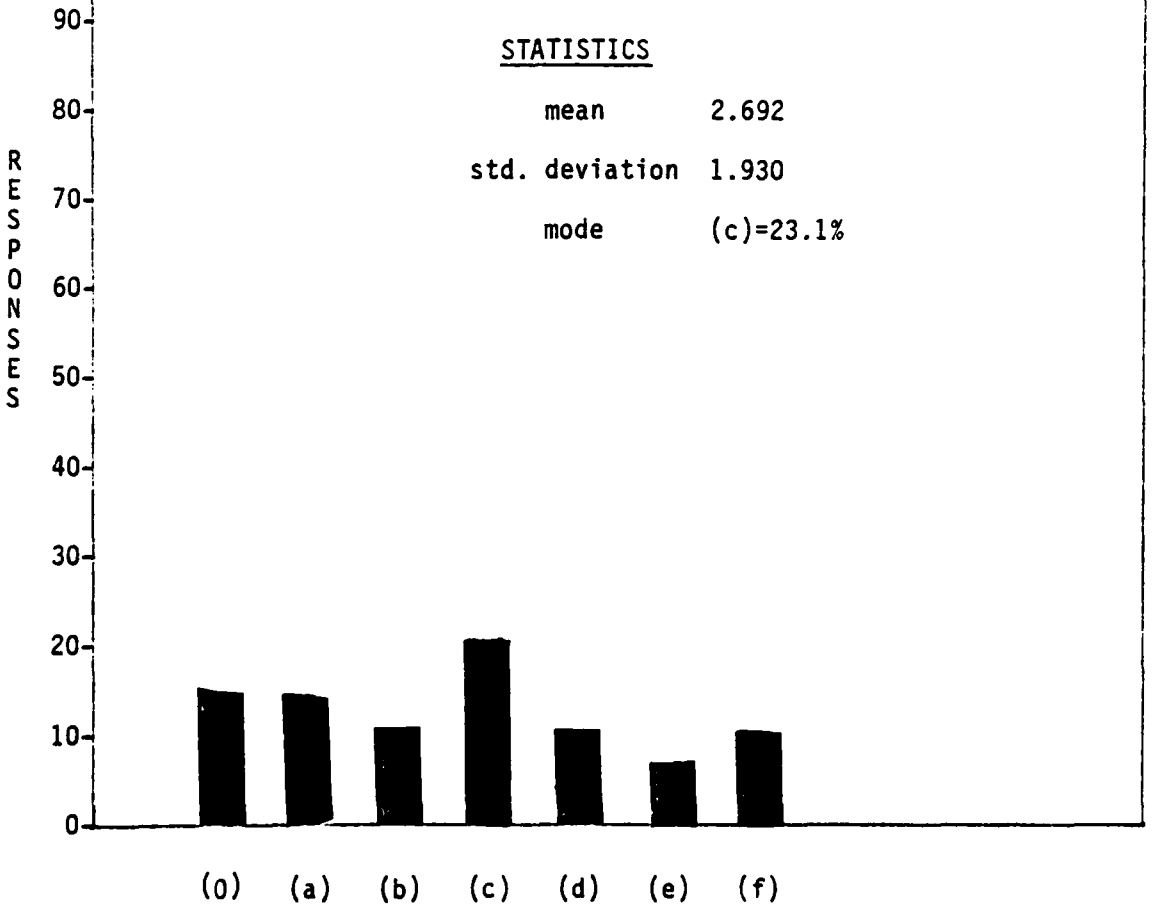
(b) 2

(c) 3

(d) 4

(e) 5

(f) Over 5




STATISTICS

| | |
|---|---|
| mean | 2.692 |
| std. deviation | 1.930 |
| mode | (c)=23.1% |

Q.9. How many majors are authorized in your organization?

(o) None

(a) 1

(b) 2

(c) 3

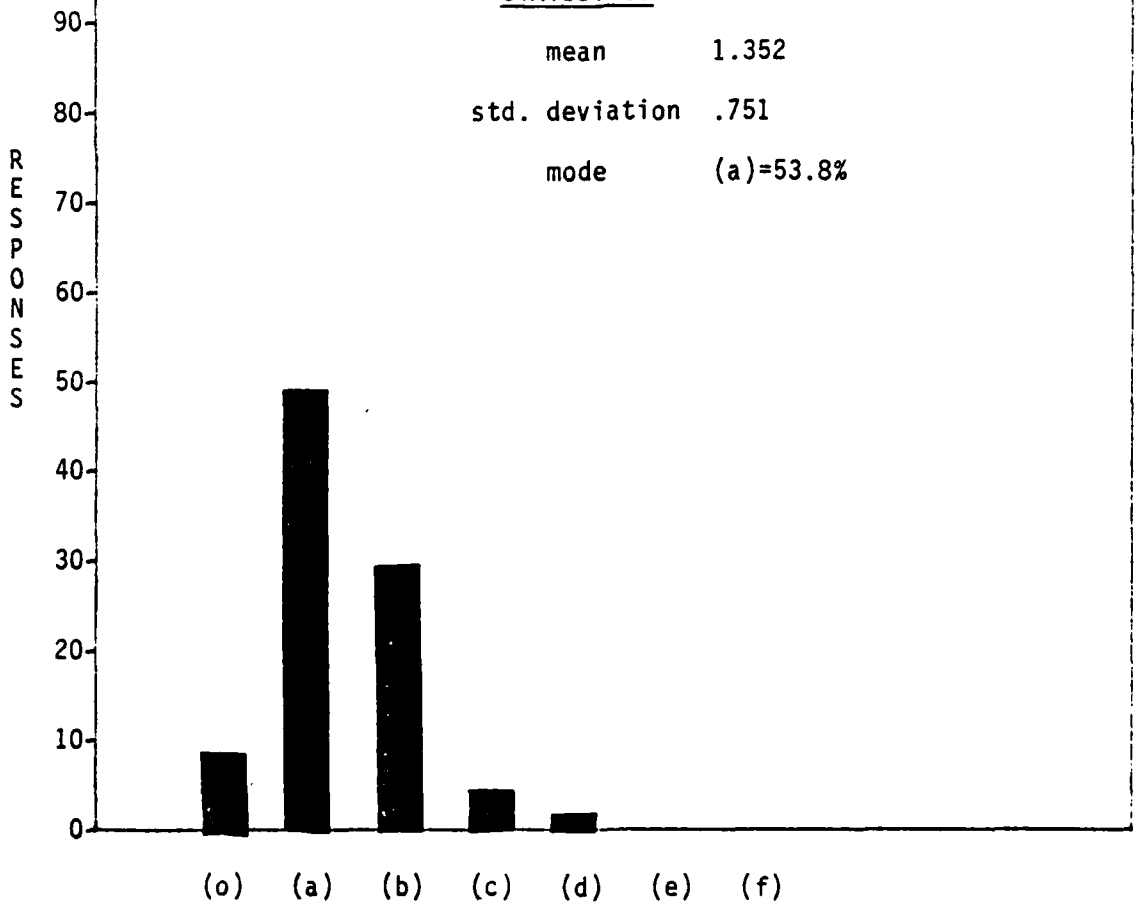
(d) 4

(e) 5

(f) Over 5

STATISTICS

| | |
|---|---|
| mean | 1.352 |
| std. deviation | .751 |
| mode | (a)=53.8% |



Q.10. How many of your major authorizations are filled by majors?

(o) None

(a) 1

(b) 2

(c) 3

(d) 4

(e) 5

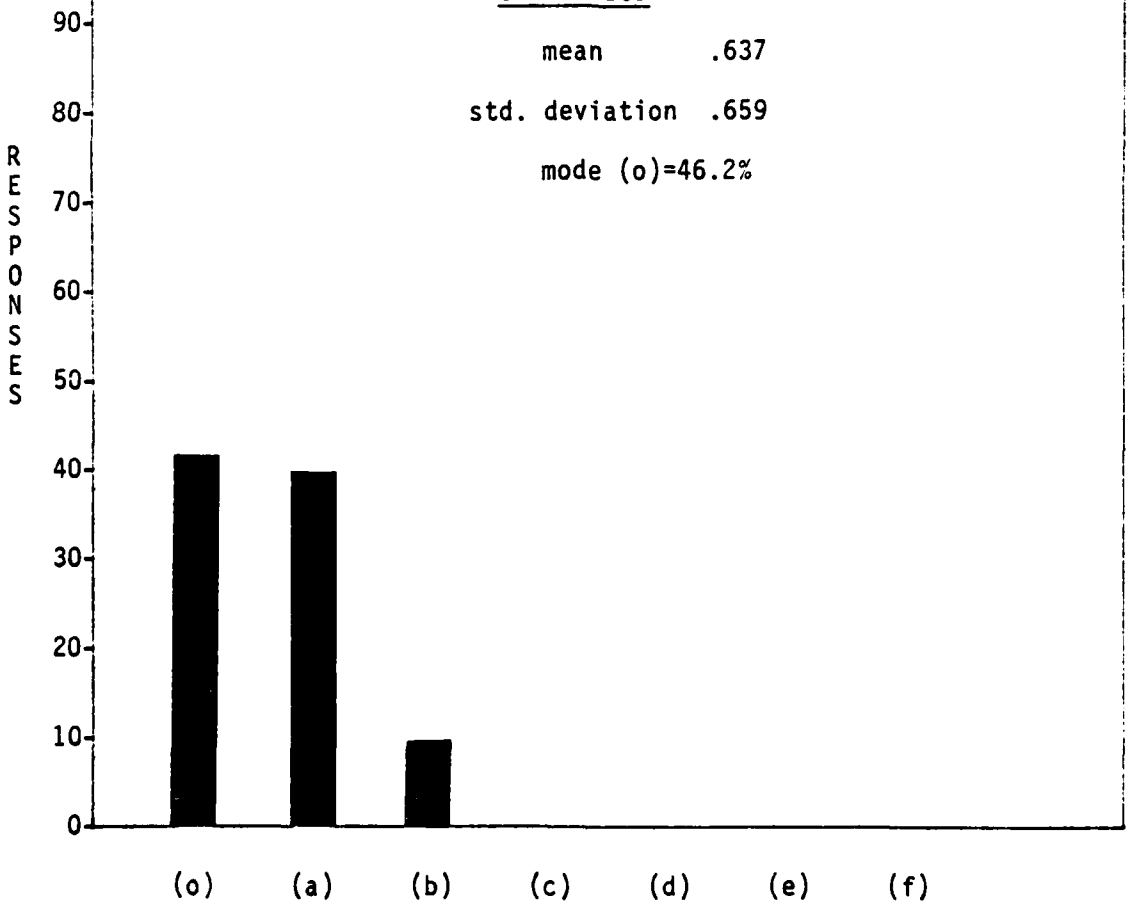
(f) Over 5

STATISTICS

mean .637

std. deviation .659

mode (o)=46.2%



Q.11. How many of your major authorizations are filled with officers below the authorized grade?

(o) None

(a) 1

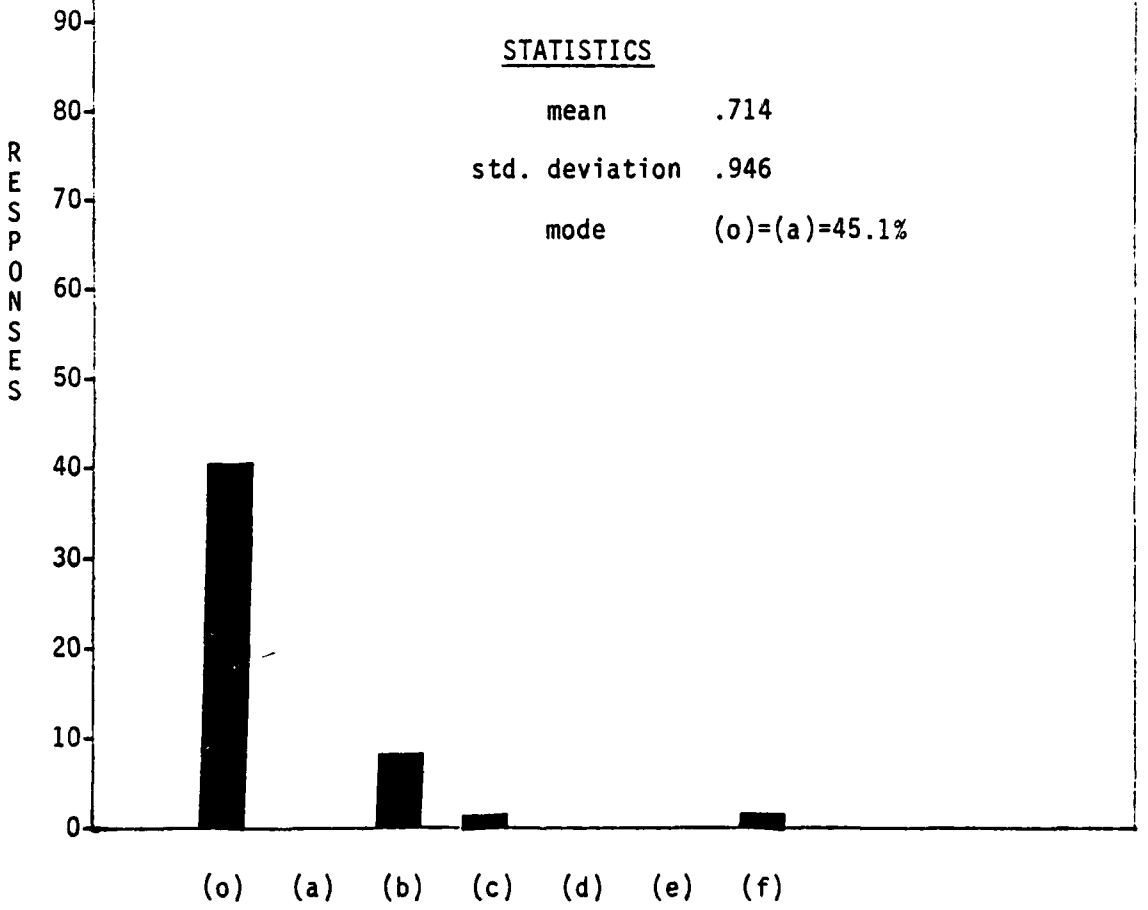
(b) 2

(c) 3

(d) 4

(e) 5

(f) Over 5




STATISTICS

| | |
|---|---|
| mean | .714 |
| std. deviation | .946 |
| mode | (o)=(a)=45.1% |

Q.12. How many of your major authorizations are filled by lieutenants?

(a) 1

(b) 2

(c) 3

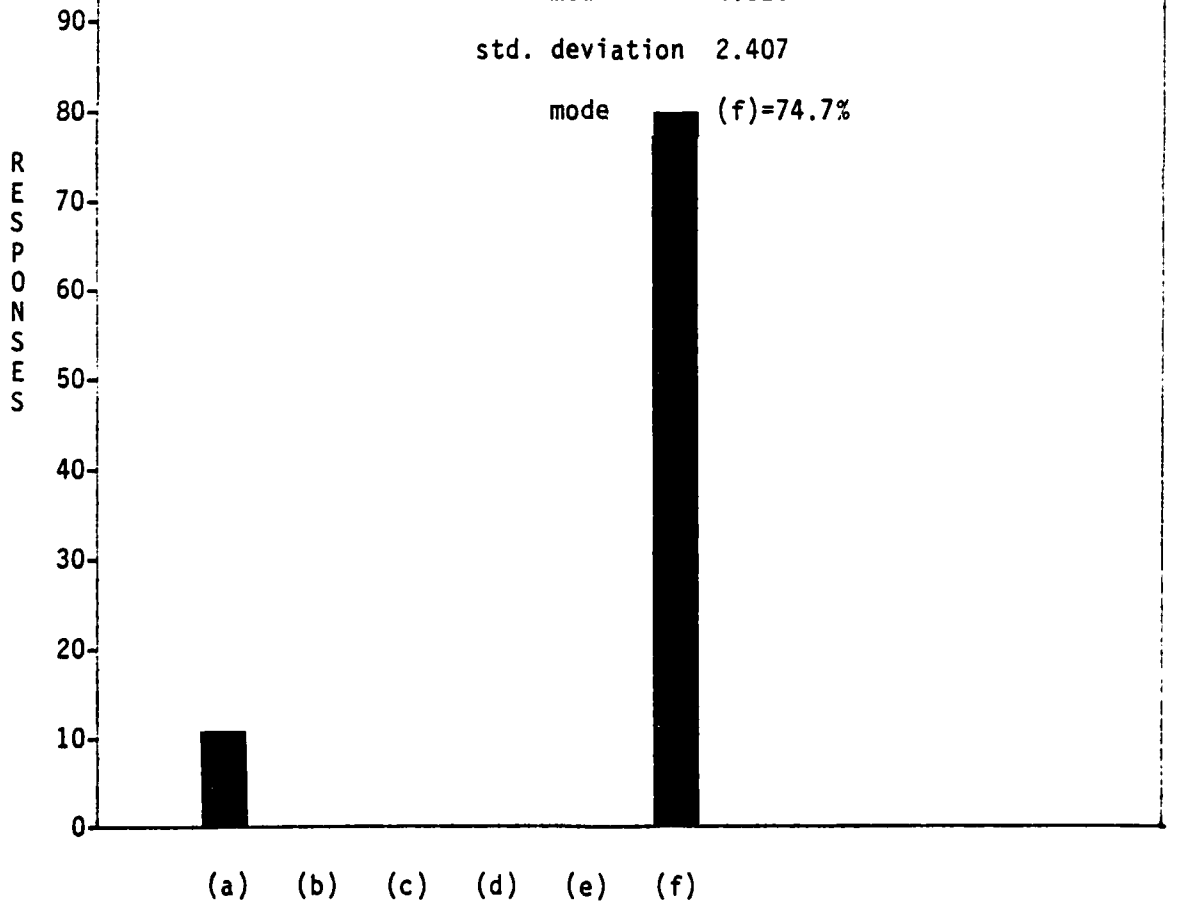
(d) 4

(e) 5

(f) None

STATISTICS

| | |
|---|---|
| mean | 4.615 |
| std. deviation | 2.407 |
| mode | (f)=74.7% |

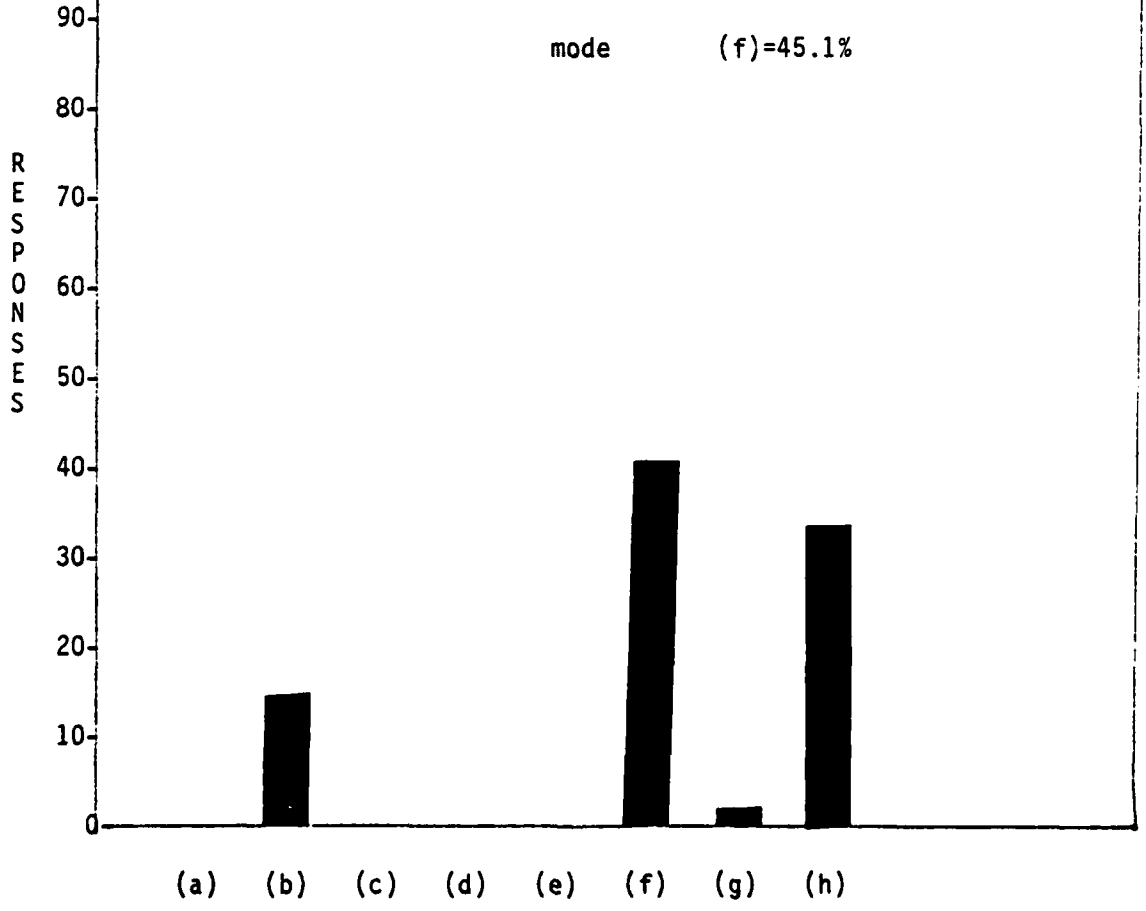


Q.13. What branch of your organization is impacted the greatest by the shortage of majors?

(a) DEA
(b) DEE
(c) DEF
(d) DEH
(e) DEI
(f) DEM
(g) Other
(h) No impact

STATISTICS

| | |
|---|---|
| mean | 3.187 |
| std. deviation | 2.808 |
| mode | (f)=45.1% |



Q.14. What branch of your organization is impacted the least by the shortage of majors?

(a) DEA

(b) DEE

(c) DEI

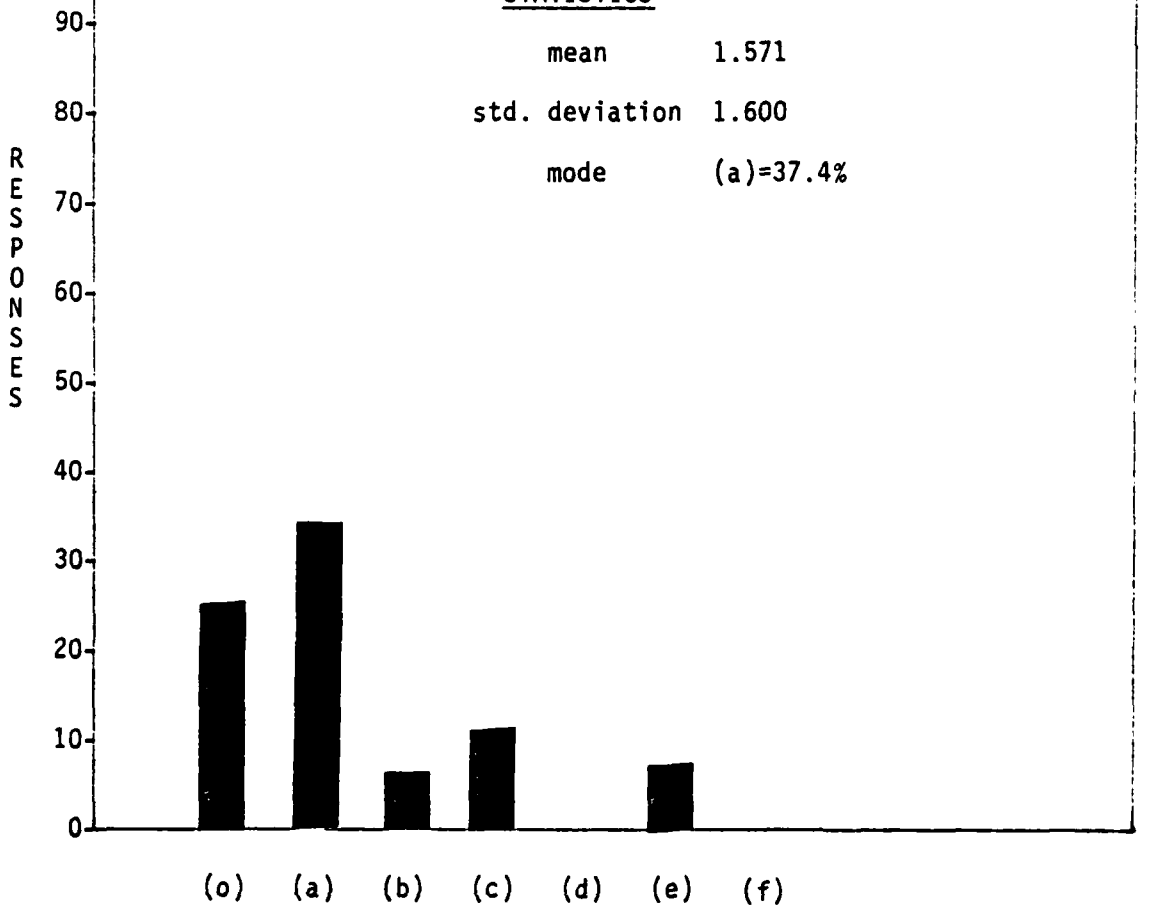
(d) DEM

(e) Other

(f) No impact

STATISTICS

| | |
|---|---|
| mean | 1.571 |
| std. deviation | 1.600 |
| mode | (a)=37.4% |

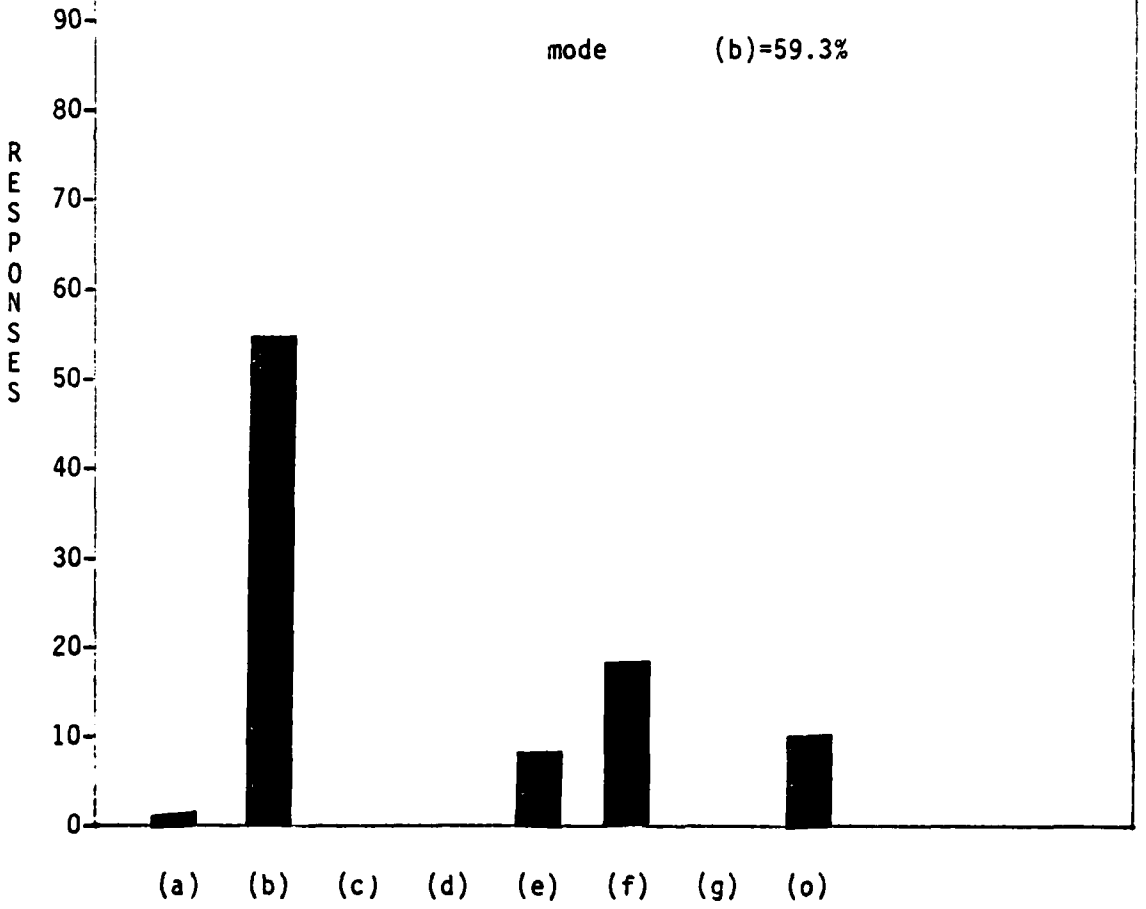


Q.15. What branch of your organization is impacted the greatest by the shortage of captains?

(a) DEA
(b) DEE
(c) DEF
(d) DEH
(e) DEI
(f) DEM
(g) Other
(o) No impact

STATISTICS

| | |
|---|---|
| mean | 2.780 |
| std. deviation | 1.937 |
| mode | (b)=59.3% |



Q.16. What branch of your organization is impacted the least by the shortage of captains?

(a) DEA

(b) DEE

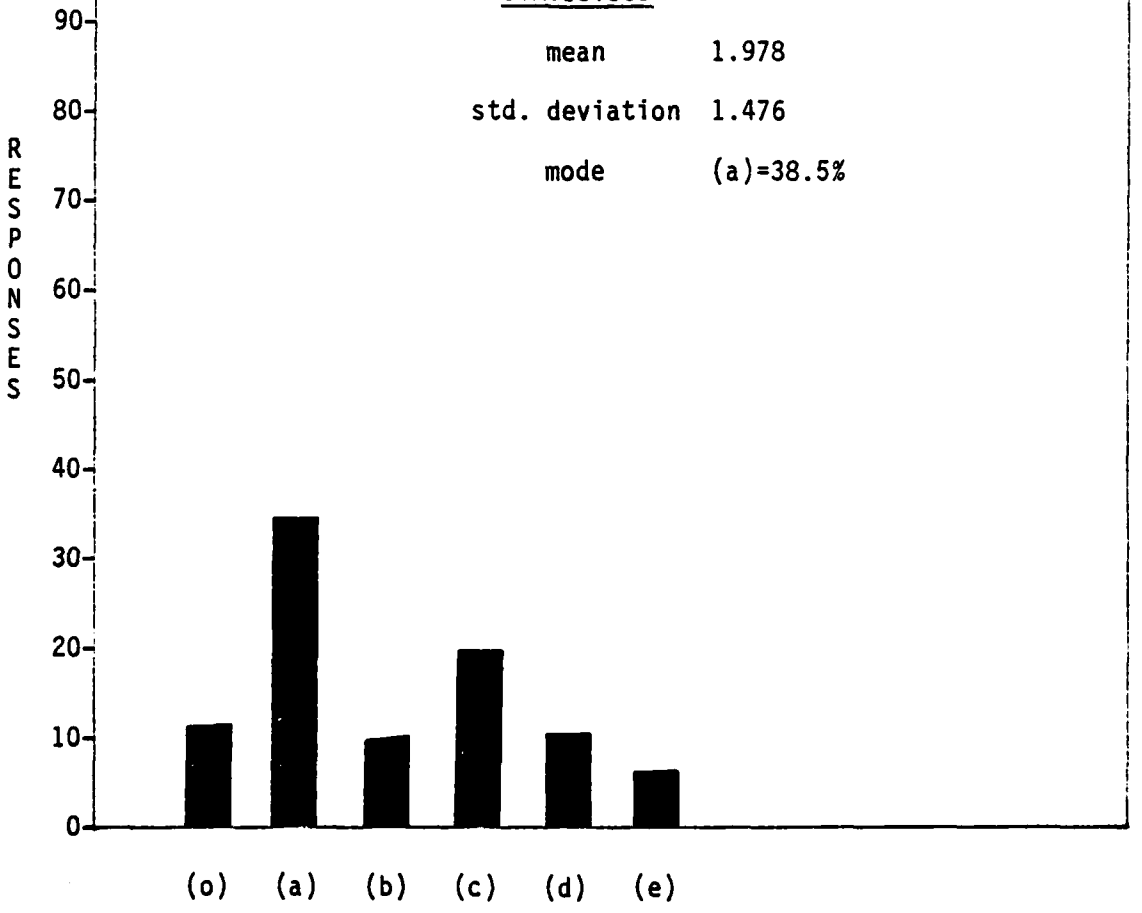
(c) DEI

(d) DEM

(e) Other

STATISTICS

| | |
|---|---|
| mean | 1.978 |
| std. deviation | 1.476 |
| mode | (a)=38.5% |



Q.17. What is the authorized rank of your Chief of Resources and Requirements ?

(a) second lieutenant

(b) first lieutenant

(c) captain

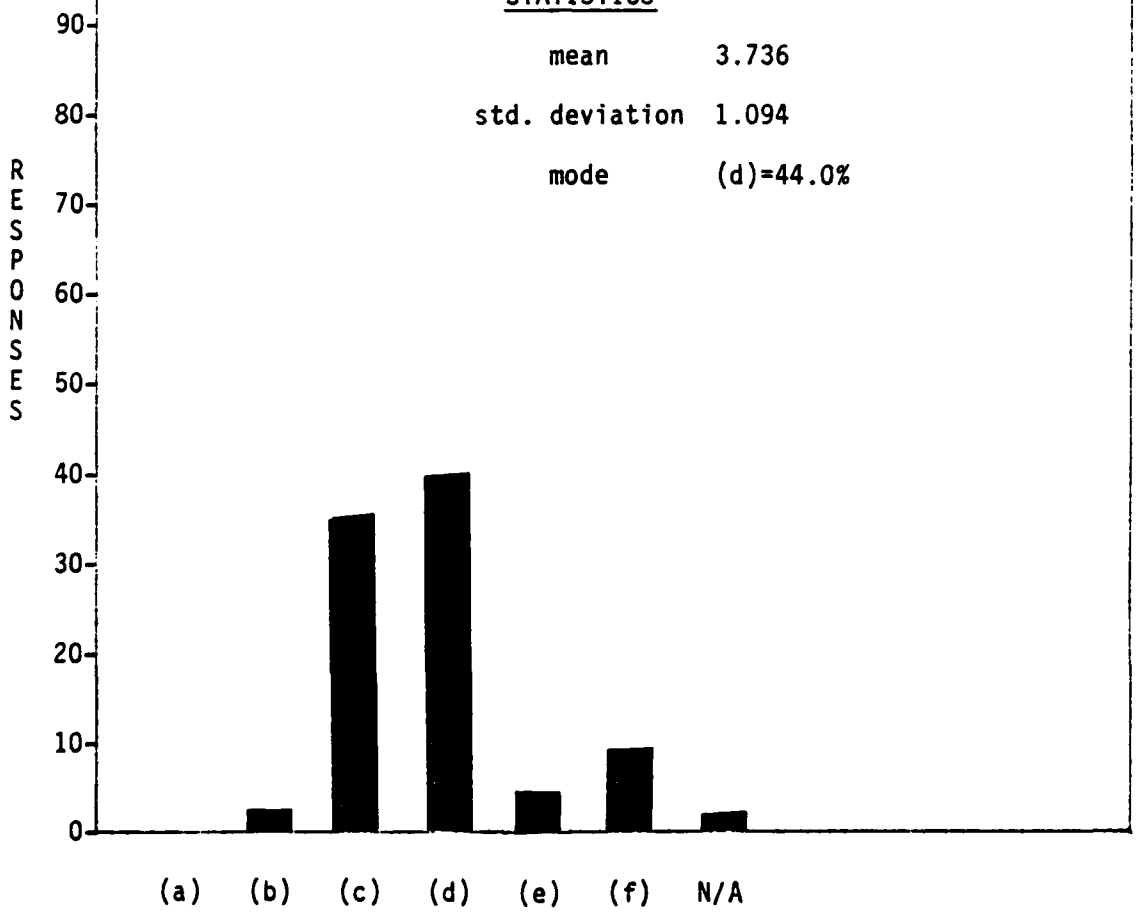
(d) major

(e) NCO

(f) civilian

STATISTICS

| | |
|---|---|
| mean | 3.736 |
| std. deviation | 1.094 |
| mode | (d)=44.0% |



Q.18. What is the rank of your assigned Chief of Resources and Requirements?

(a) second lieutenant

(b) first lieutenant

(c) captain

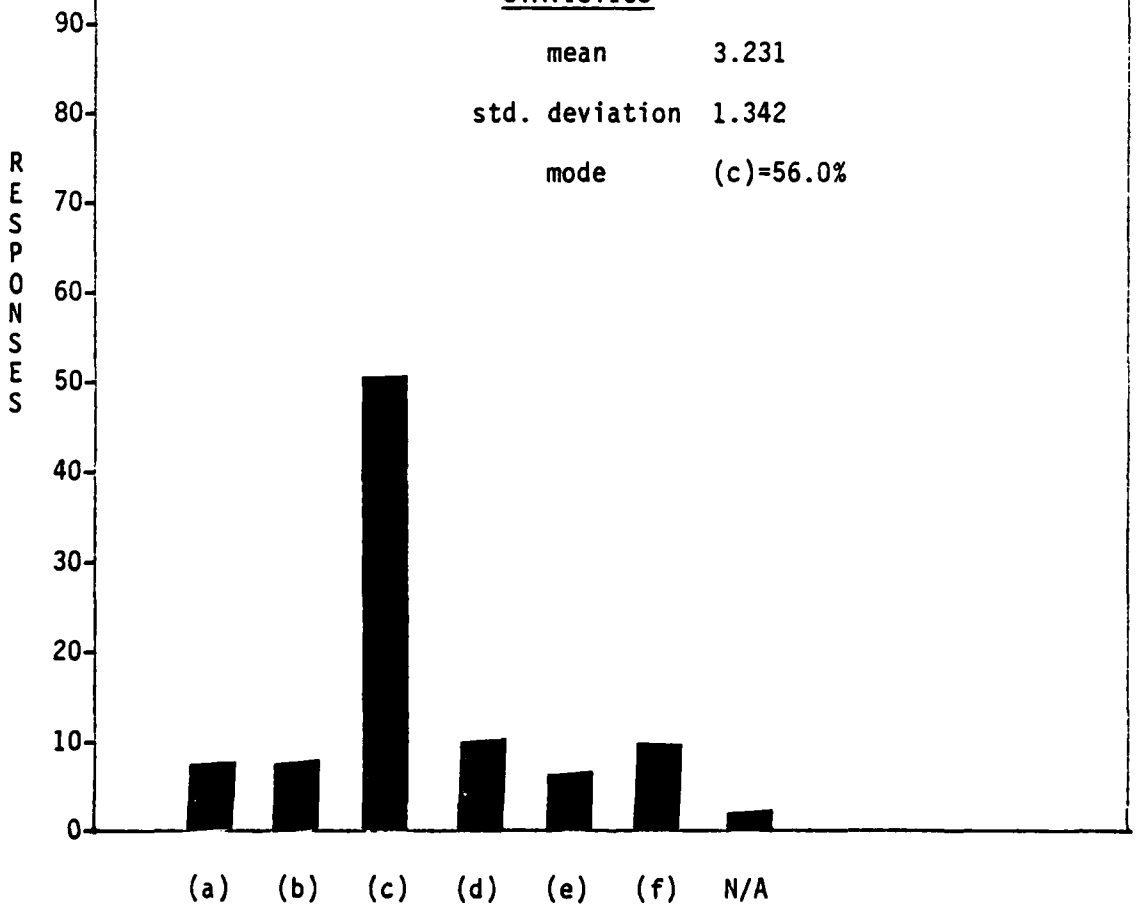
(d) major

(e) NCO

(f) civilian

STATISTICS

| | |
|---|---|
| mean | 3.231 |
| std. deviation | 1.342 |
| mode | (c)=56.0% |



Q.19. What is the maintenance project approval authority of your Chief of Resources and Requirements?

(a) $400,000 or less

(b) 300,000 or less

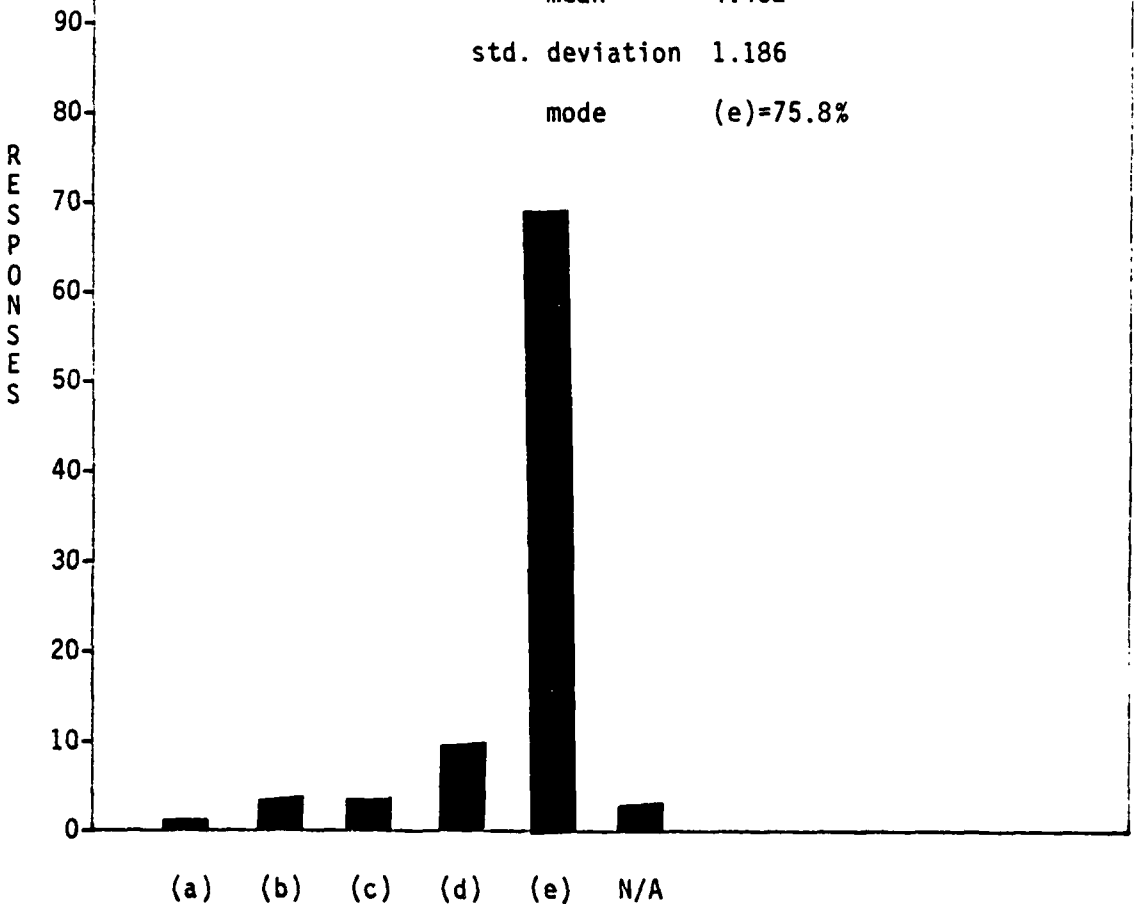
(c) 200,000 or less

(d) 100,000 or less

(e) 50,000 or less

STATISTICS

| | |
|---|---|
| mean | 4.462 |
| std. deviation | 1.186 |
| mode | (e)=75.8% |



Q.20. What is the repair project approval authority of your Chief of Resources and Requirements?

(a) $400,000 or less

(b) 300,000 or less

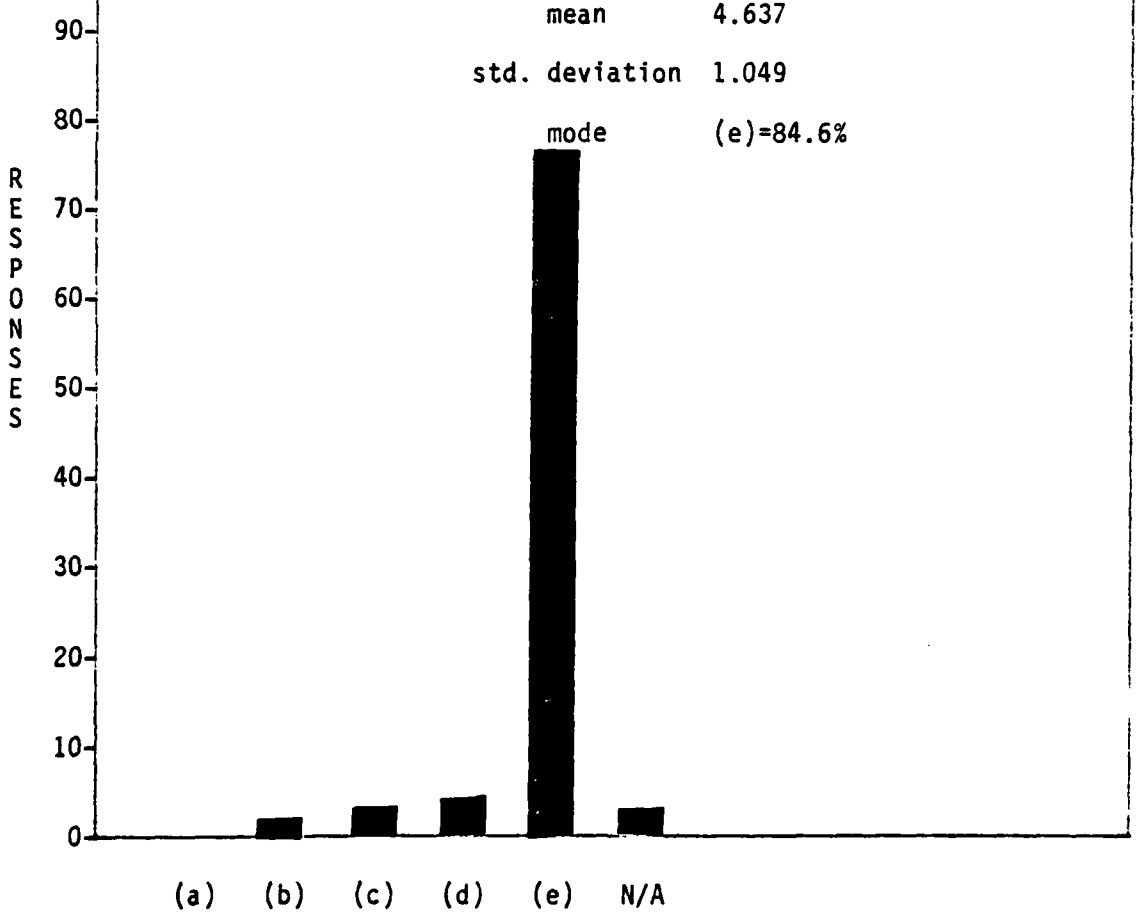
(c) 200,000 or less

(d) 100,000 or less

(e) 50,000 or less

STATISTICS

| | |
|---|---|
| mean | 4.637 |
| std. deviation | 1.049 |
| mode | (e)=84.6% |



Q.21. What is the minor construction project approval authority of your Chief of Resources and Requirements?

(a) less than $5,000

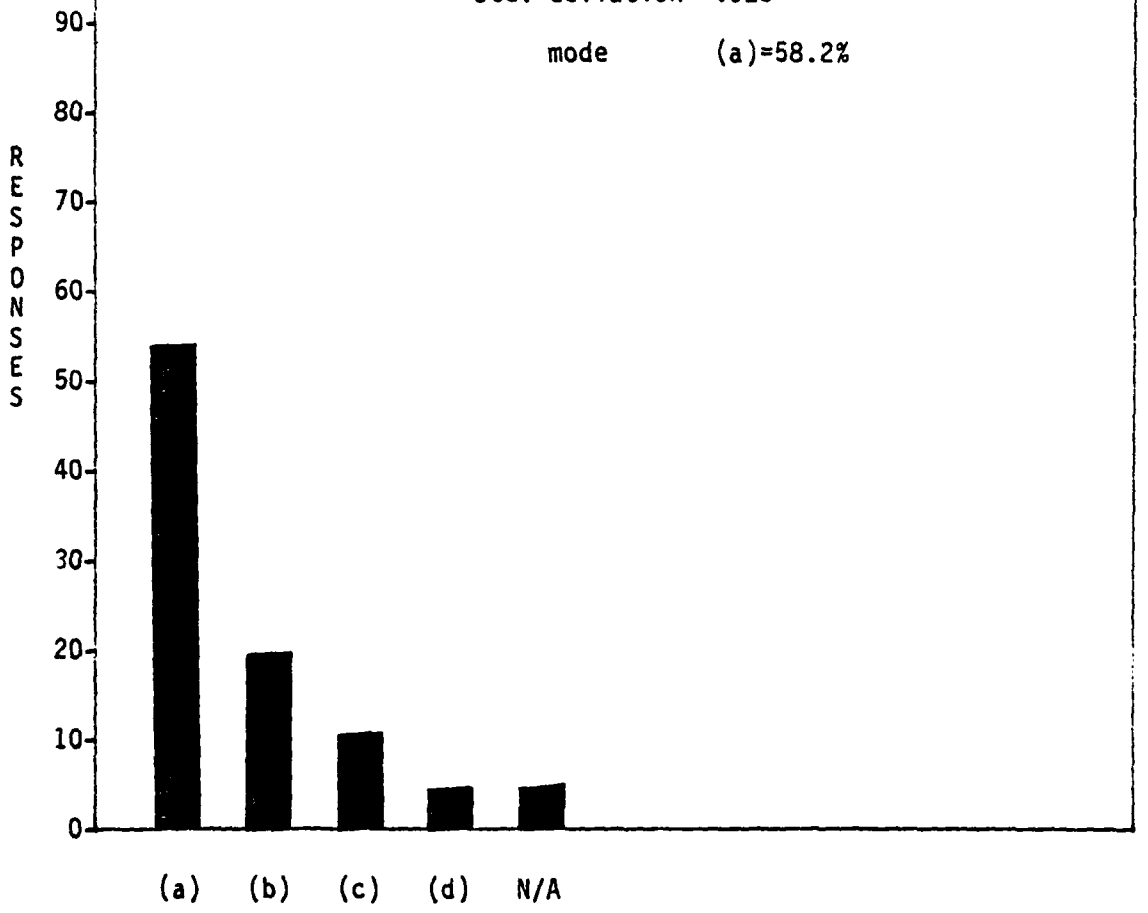
(b) $5,000 but less than $10,000

(c) $10,000 but less than $15,000

(d) Greater than $15,000

STATISTICS

| | |
|---|---|
| mean | 1.538 |
| std. deviation | .923 |
| mode | (a)=58.2% |



Q.22. What is the authorized rank of your Chief of Operations?

(a) second lieutenant

(b) first lieutenant

(c) captain

(d) major

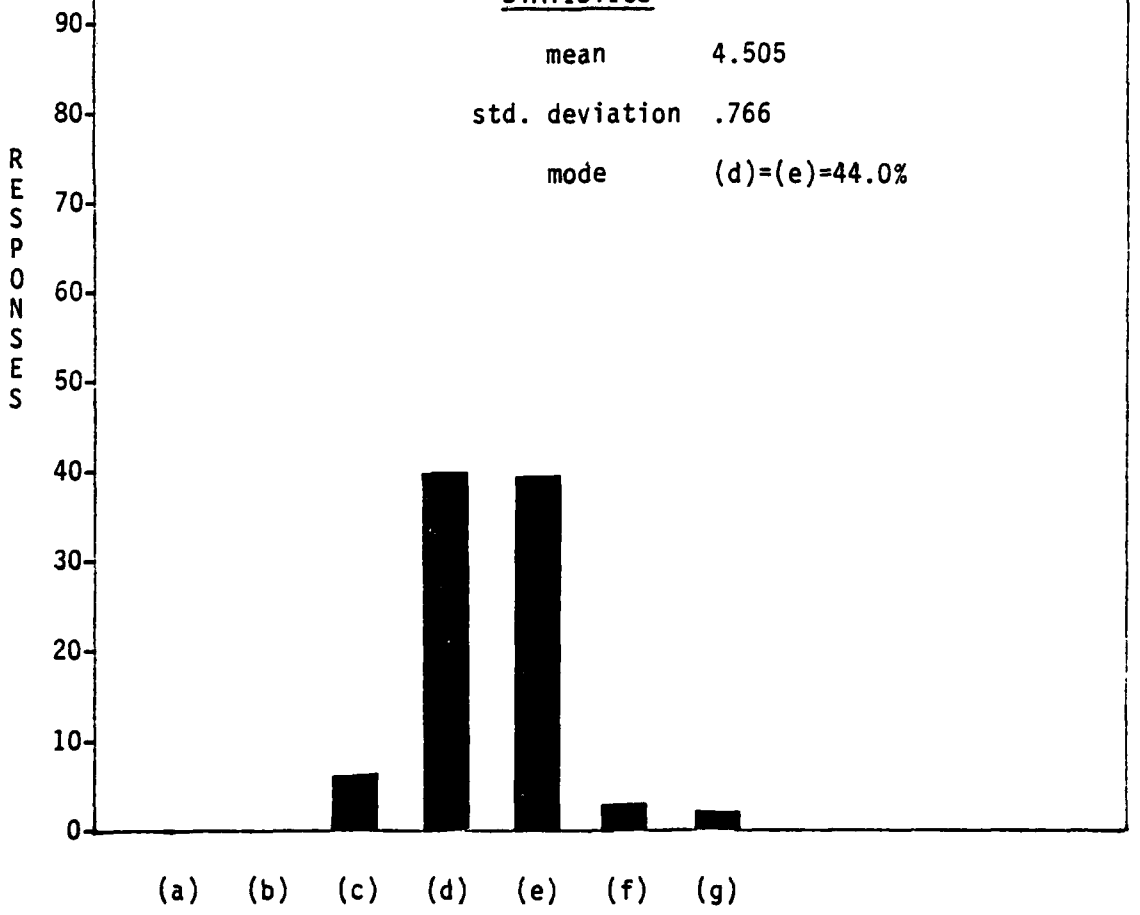
(e) lieutenant colonel

(f) NCO

(g) civilian

STATISTICS

| | |
|---|---|
| mean | 4.505 |
| std. deviation | .766 |
| mode | (d)=(e)=44.0% |



Q.23. What is the rank of your assigned Chief of Operations?

(a) second lieutenant

(b) first lieutenant

(c) captain

(d) major

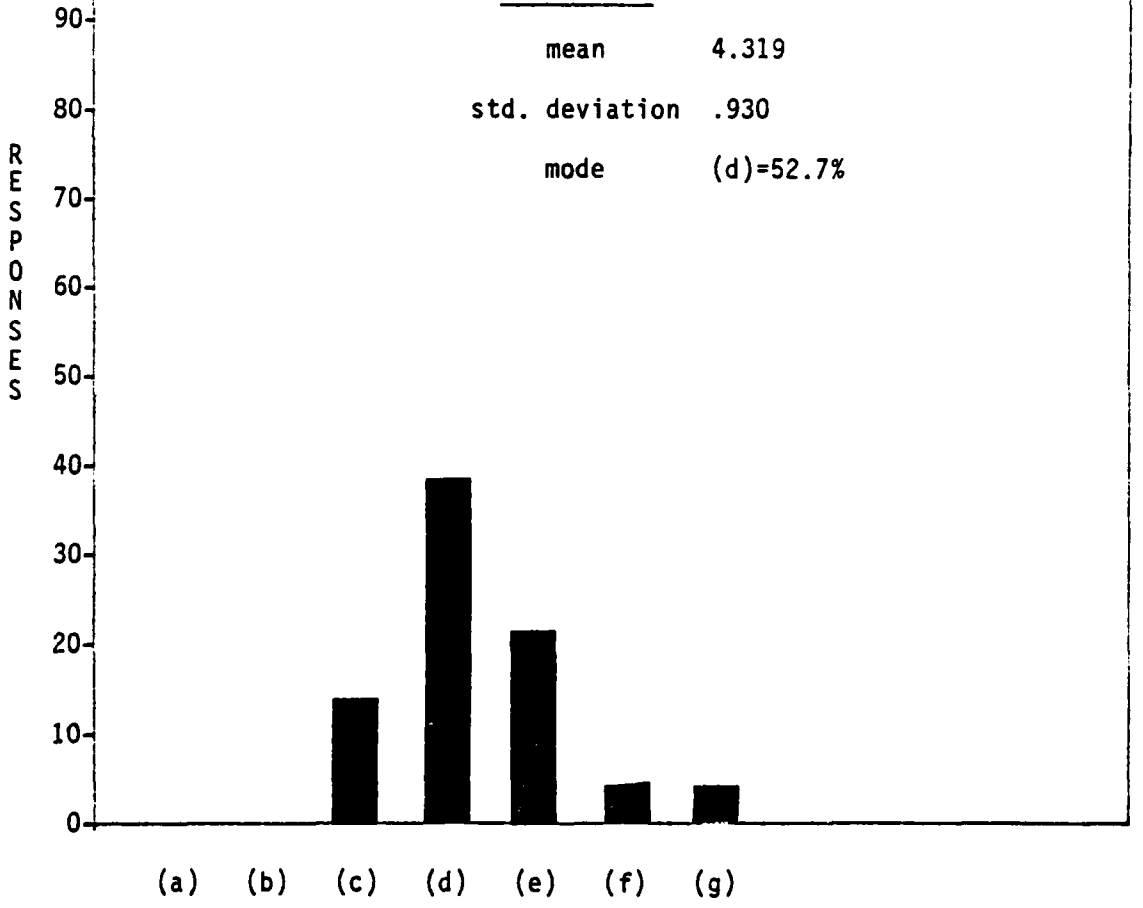
(e) lieutenant colonel

(f) NCO

(g) civilian

STATISTICS

| | |
|---|---|
| mean | 4.319 |
| std. deviation | .930 |
| mode | (d)=52.7% |



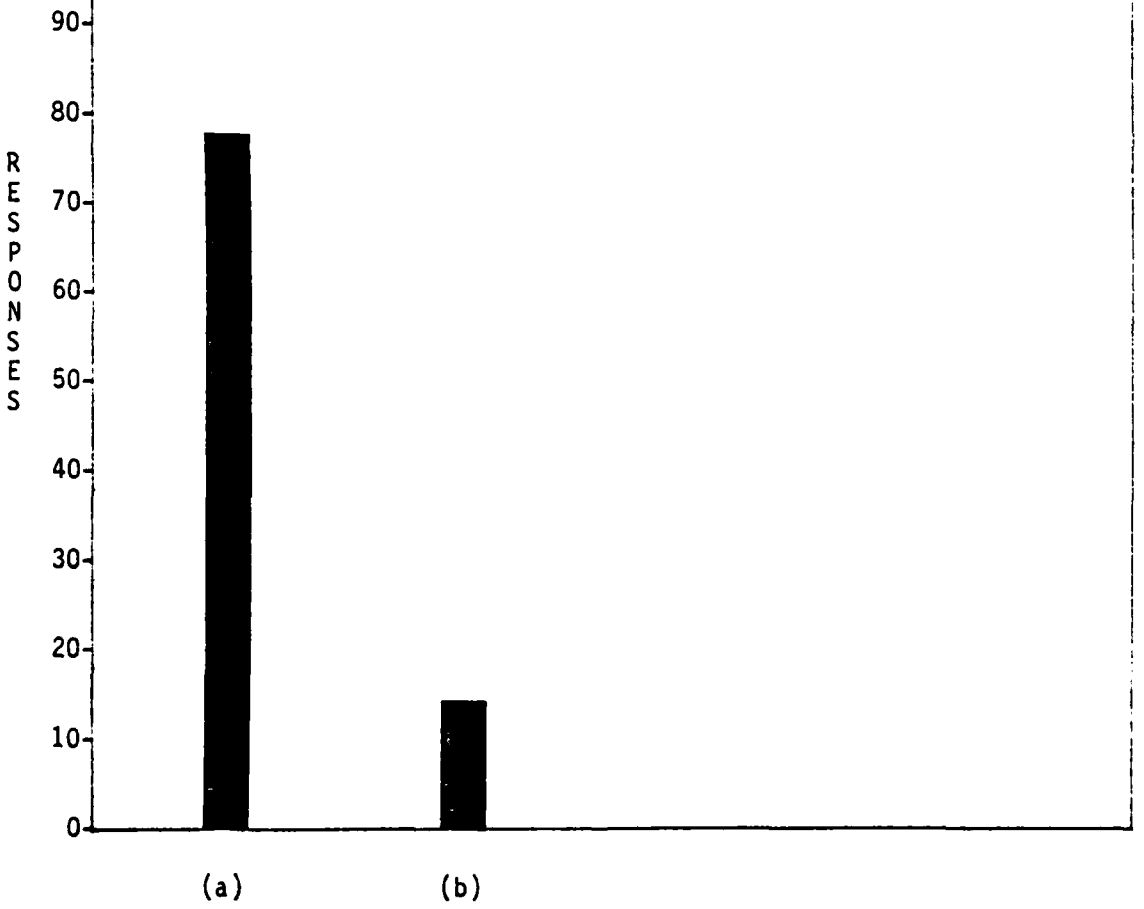
Q.24. Does your Chief of Operations have approval authority for maintenance and repair work?

(a) Yes

(b) No

STATISTICS

| | |
|---|---|
| mean | 1.154 |
| std. deviation | .363 |
| mode | (a)=84.6% |



Q.25. What minor construction project approval authority does your Chief of Operations have?

(a) less than $5,000

(b) $5,000 but less than $10,000

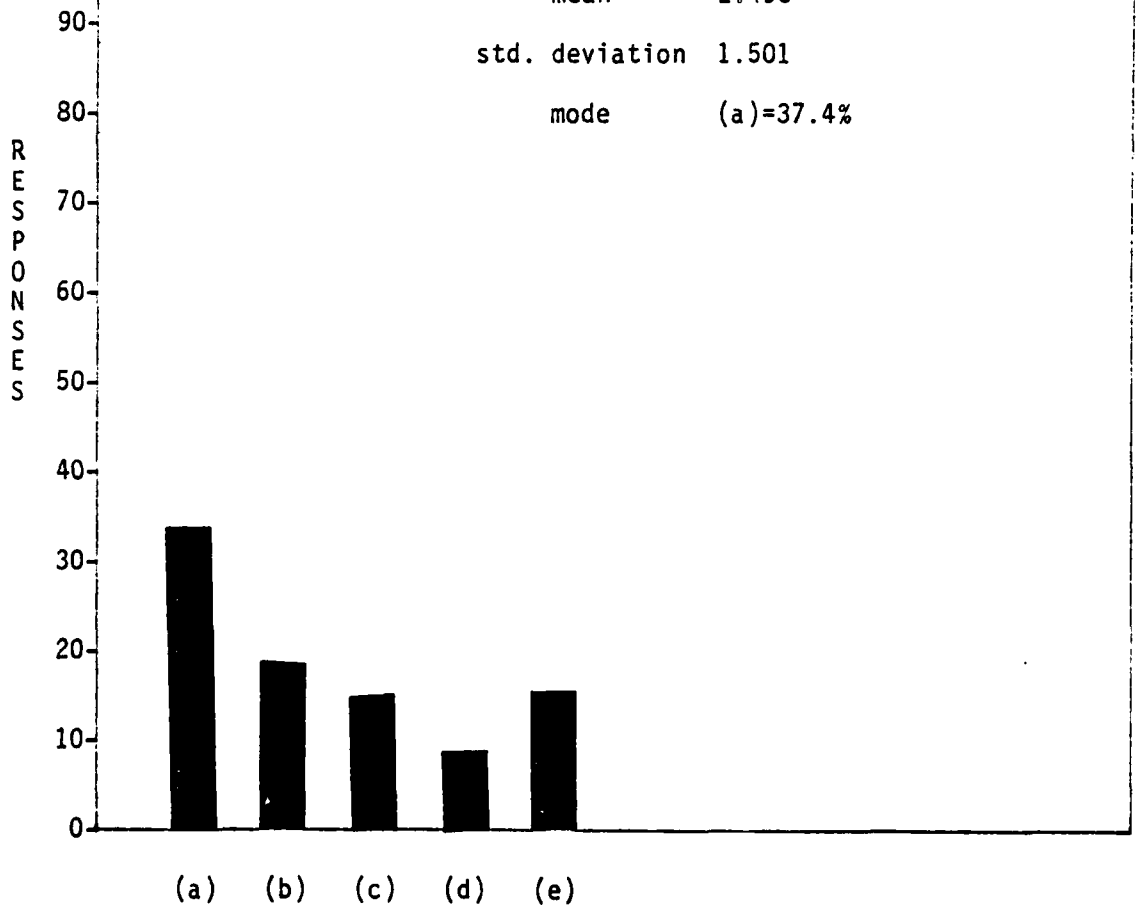
(c) $10,000 but less than $15,000

(d) $15,000 but less than $25,000

(e) The Chief of Operations has no approval authority

STATISTICS

| | |
|---|---|
| mean | 2.495 |
| std. deviation | 1.501 |
| mode | (a)=37.4% |

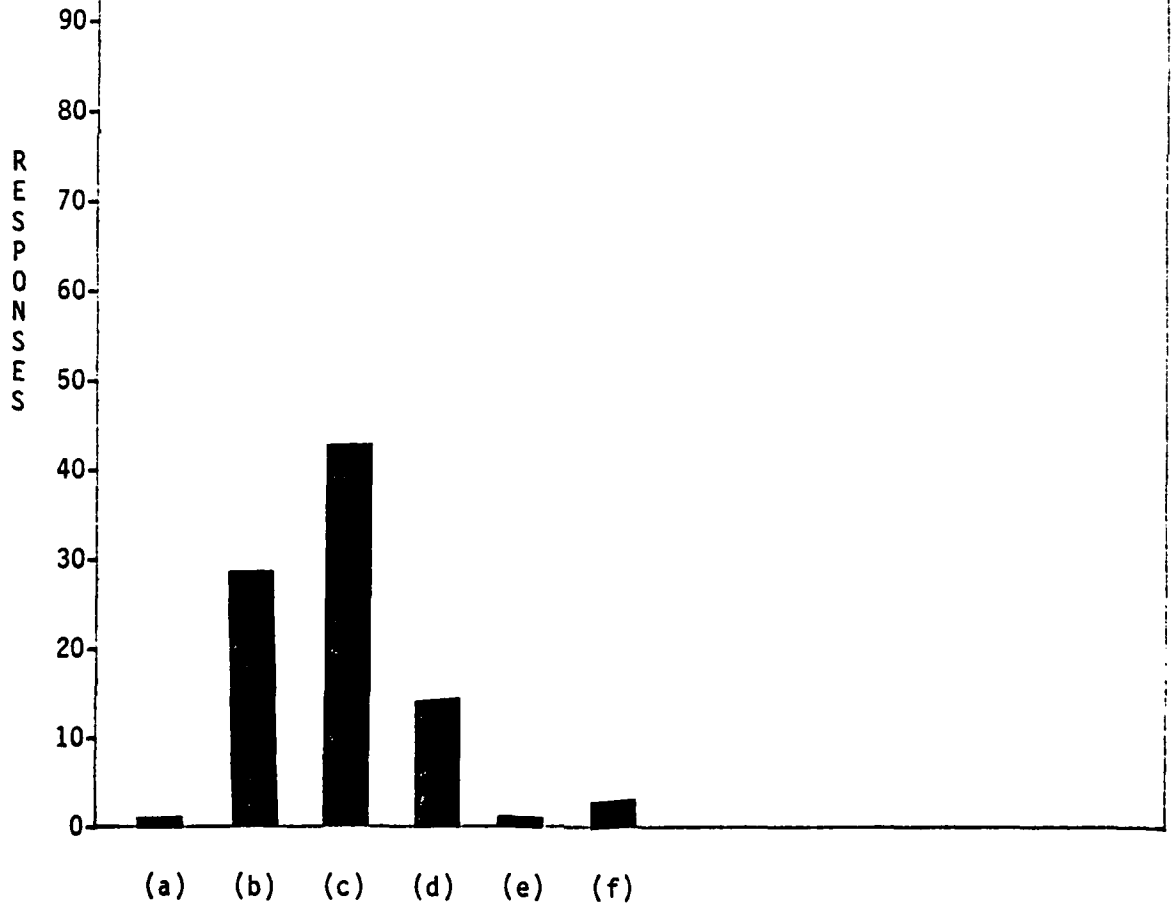


Q.26. What is the rank of the military officer who acts in your stead?

(a) colonel
(b) lieutenant colonel
(c) major
(d) captain
(e) first lieutenant
(f) second lieutenant

STATISTICS

| | |
|---|---|
| mean | 2.923 |
| std. deviation | .957 |
| mode | (c)=47.3% |



Q.27. What is your mainentance project approval authority?

(a) $500,000 or less

(b) 400,000 or less

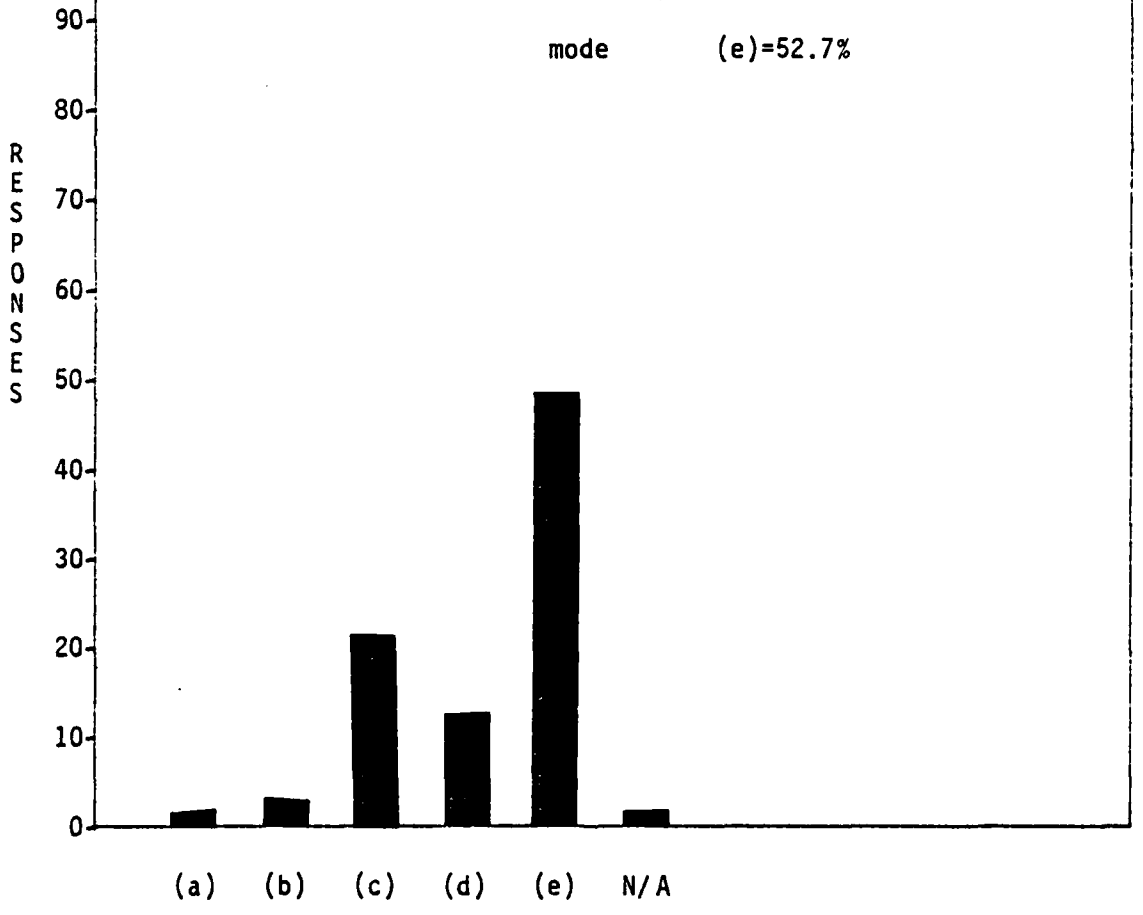
(c) 300,000 or less

(d) 200,000 or less

(e) 100,000 or less

STATISTICS

| | |
|---|---|
| mean | 4.044 |
| std. deviation | 1.228 |
| mode | (e)=52.7% |



Q.28. What is your repair project approval authority?

(a) $400,000 or less

(b) 300,000 or less

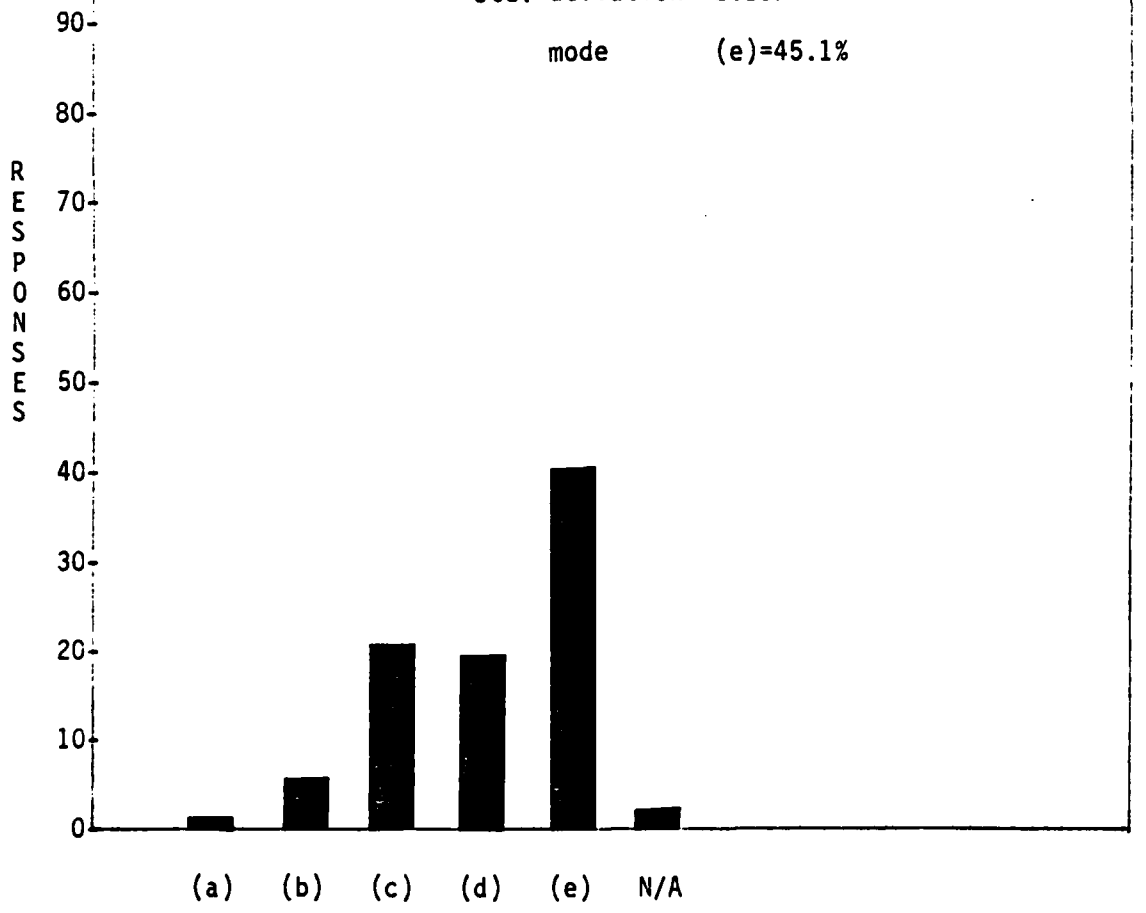
(c) 200,000 or less

(d) 100,000 or less

(e) 50,000 or less

STATISTICS

| | |
|---|---|
| mean | 3.967 |
| std. deviation | 1.187 |
| mode | (e)=45.1% |



Q.29. What is your minor construction project approval authority?

(a) less than $5,000

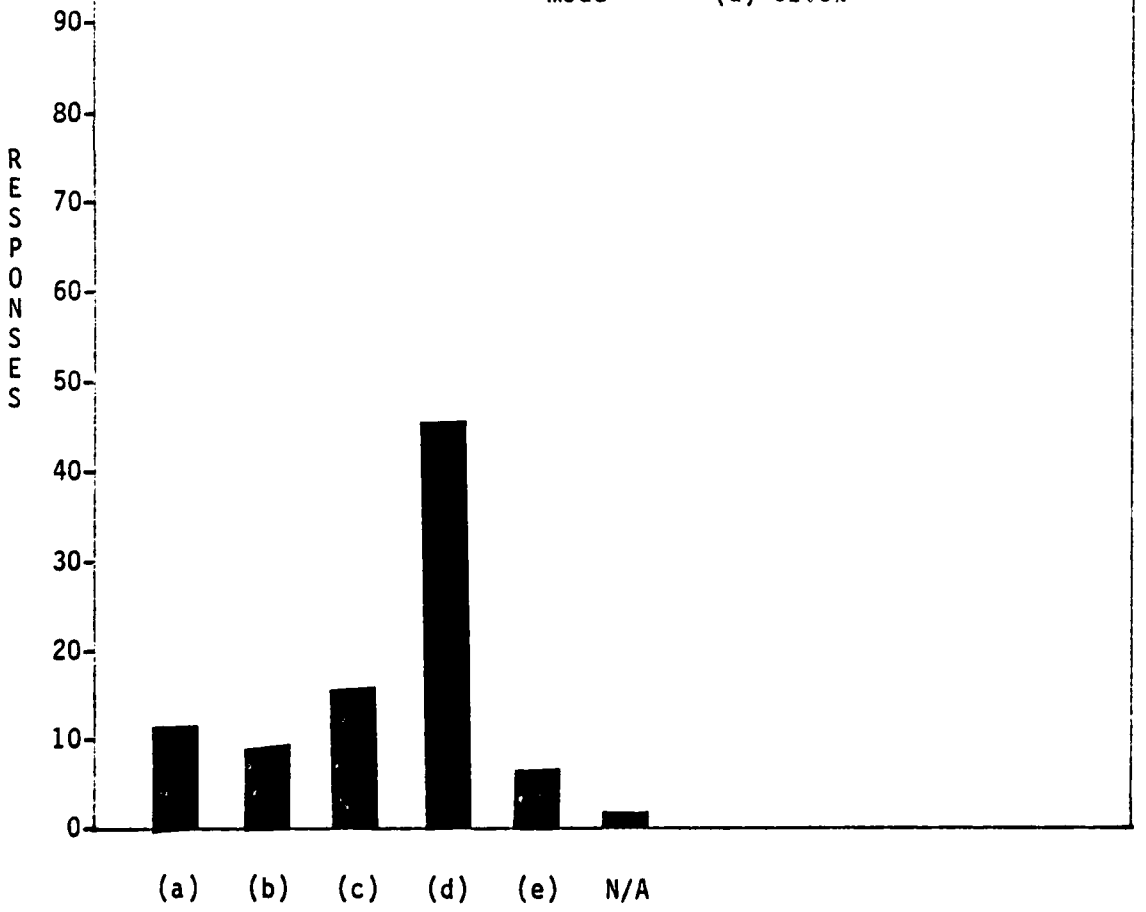
(b) $5,000 but less than $10,000

(c) $10,000 but less than $15,000

(d) $15,000 but less than $25,000

STATISTICS

| | |
|---|---|
| mean | 3.231 |
| std. deviation | 1.248 |
| mode | (d)=51.6% |



Q.30. The activities of the Industrial Engineering (DEI) Branch have decreased because of the shortage of majors and/or captains.

(a) Strongly agree

(b) Agree

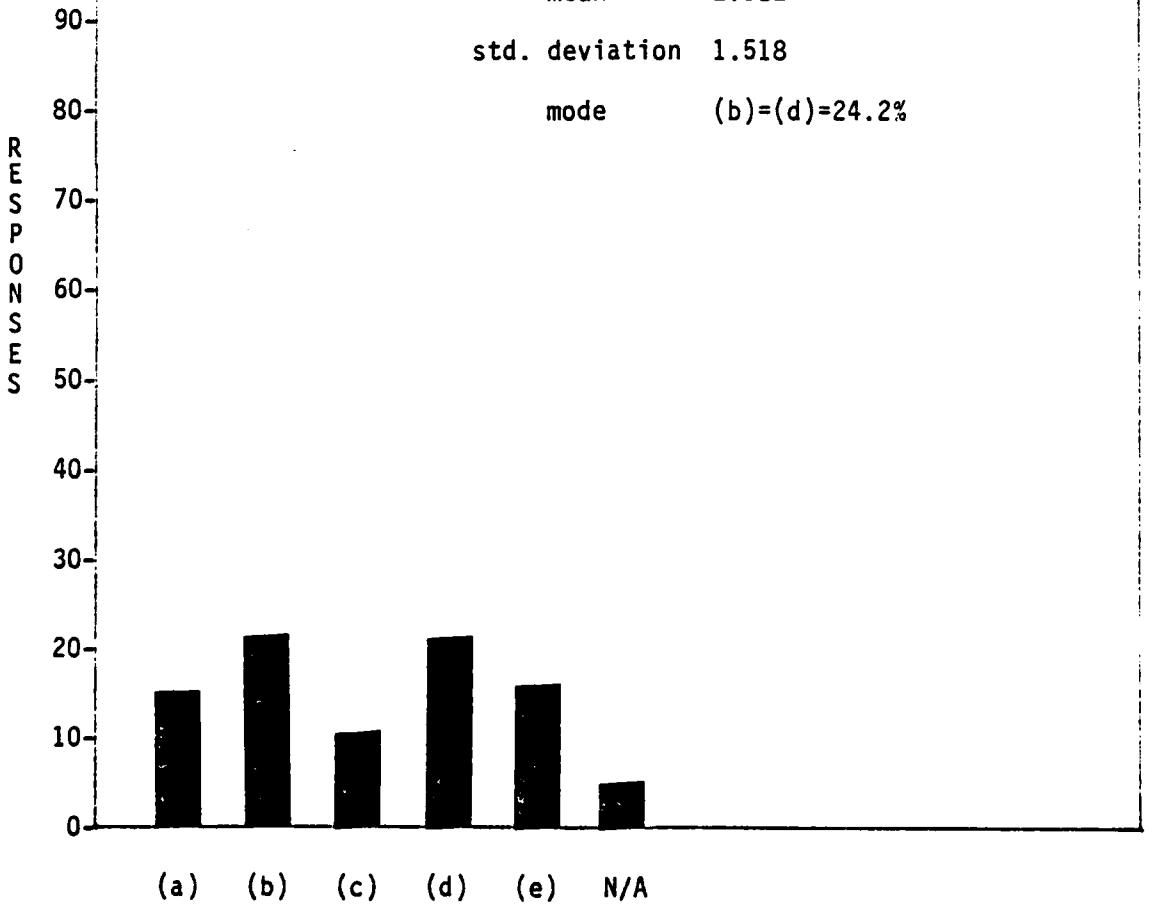
(c) Undecided

(d) Disagree

(e) Strongly disagree

STATISTICS

| | |
|---|---|
| mean | 2.912 |
| std. deviation | 1.518 |
| mode | (b)=(d)=24.2% |



Q.31. The lieutenants assigned to my organization are performing above my expectations in the Civil Engineering Career Field.

(a) Strongly agree

(b) Agree

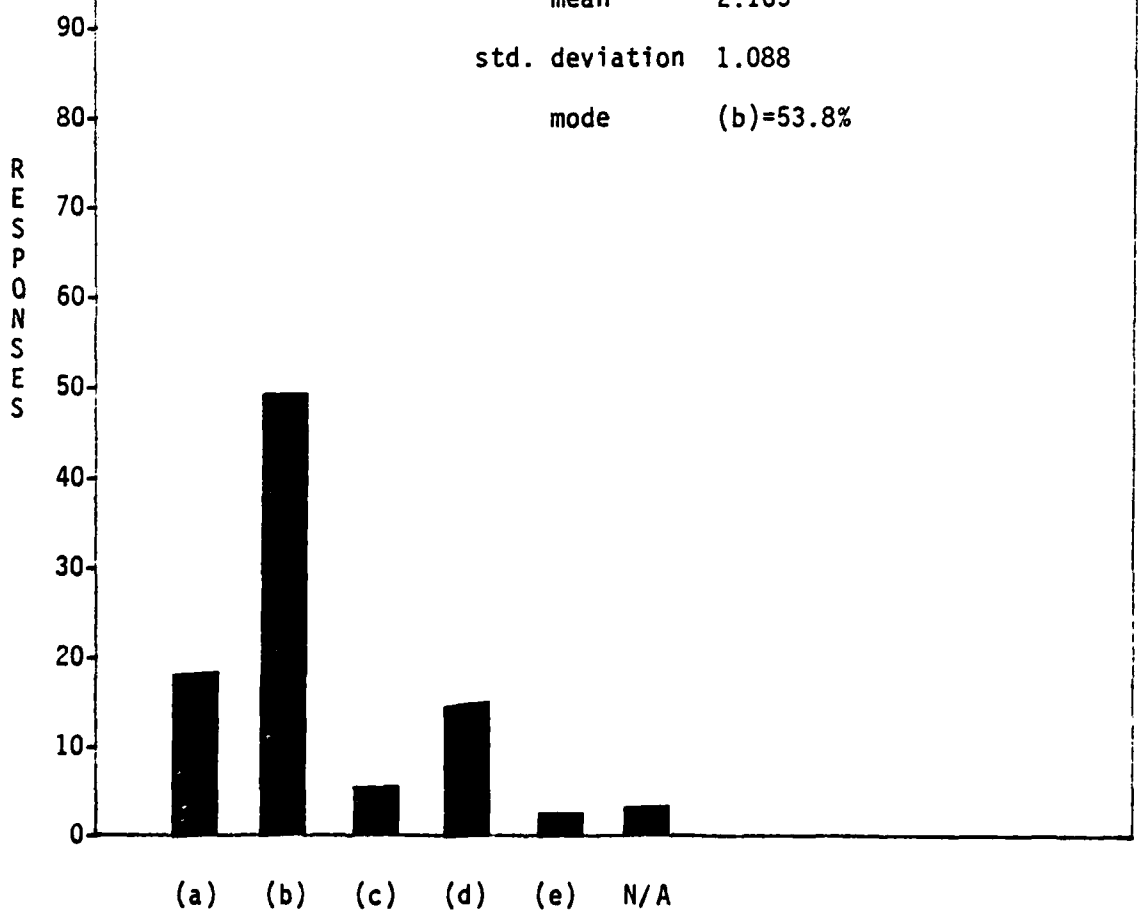
(c) Undecided

(d) Disagree

(e) Strongly disagree

STATISTICS

| | |
|---|---|
| mean | 2.165 |
| std. deviation | 1.088 |
| mode | (b)=53.8% |



Q.32. The shortage of majors and/or captains is increasing the number of decisions I personally must make about Base Civil Engineering activities.

(a) Strongly agree

(b) Agree

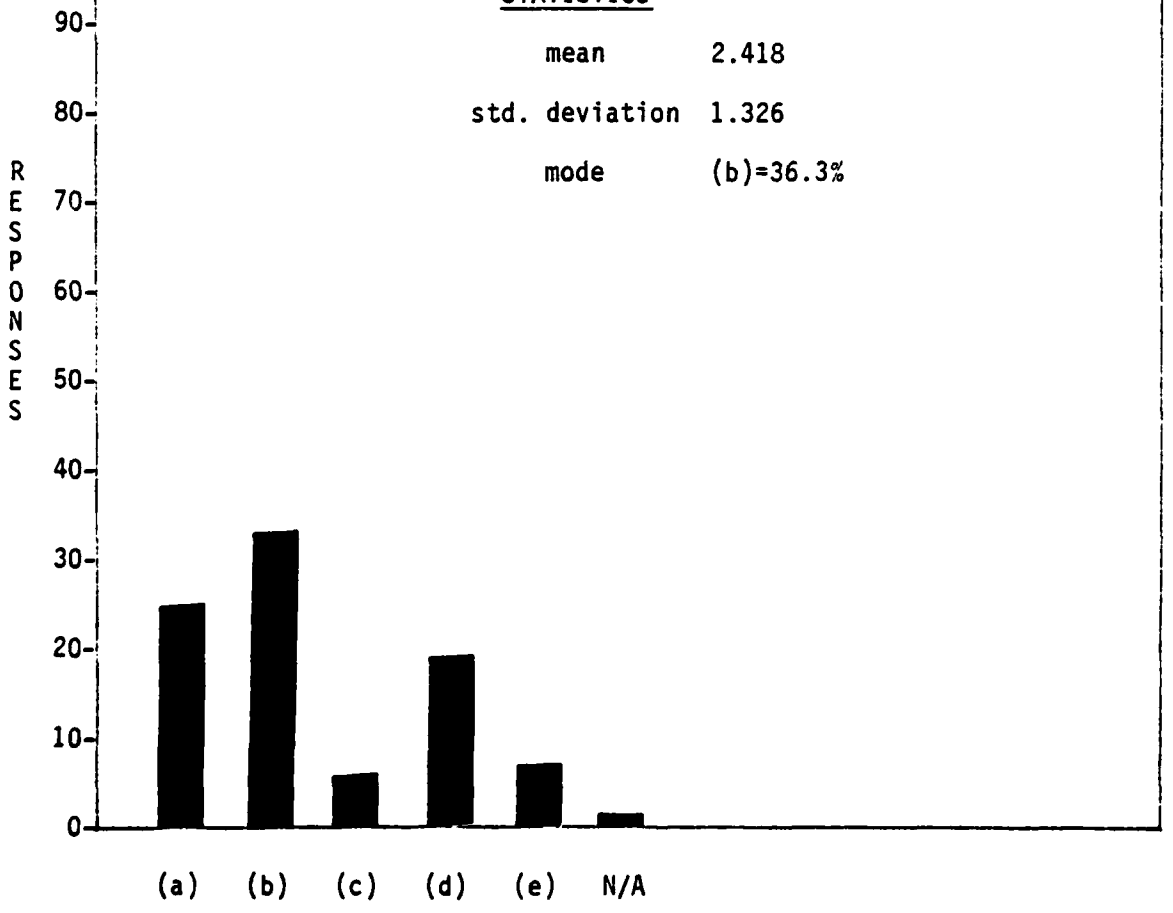
(c) Undecided

(d) Disagree

(e) Strongly disagree

STATISTICS

| | |
|---|---|
| mean | 2.418 |
| std. deviation | 1.326 |
| mode | (b)=36.3% |



Q.33. The amount of responsibility assigned to lower ranking officers places too great a strain on them.

(a) Strongly agree

(b) Agree

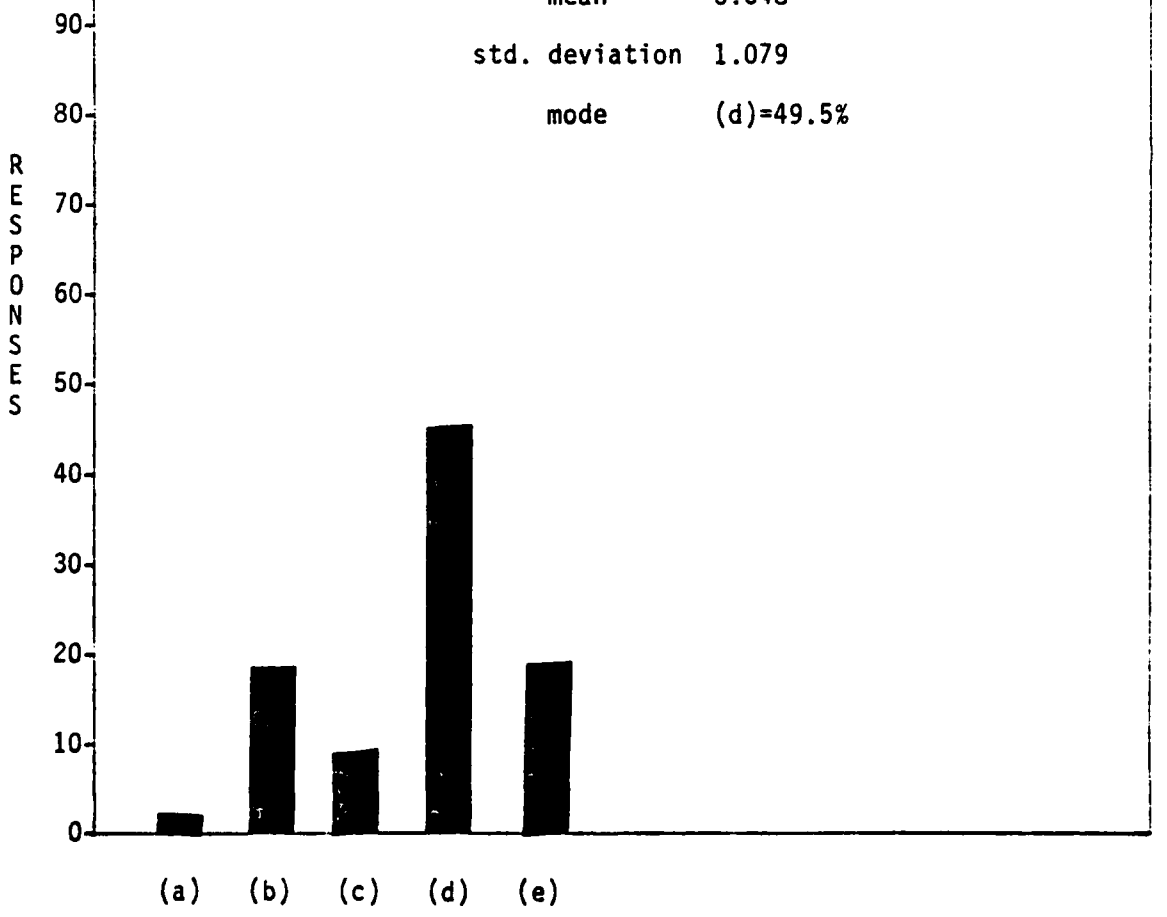
(c) Undecided

(d) Disagree

(e) Strongly disagree

STATISTICS

| | |
|---|---|
| mean | 3.648 |
| std. deviation | 1.079 |
| mode | (d)=49.5% |



Q.34. The level of maintenance, repair, and minor construction at my base has decreased because of the lack of qualified Civil Engineering majors and captains.

(a) Strongly agree

(b) Agree

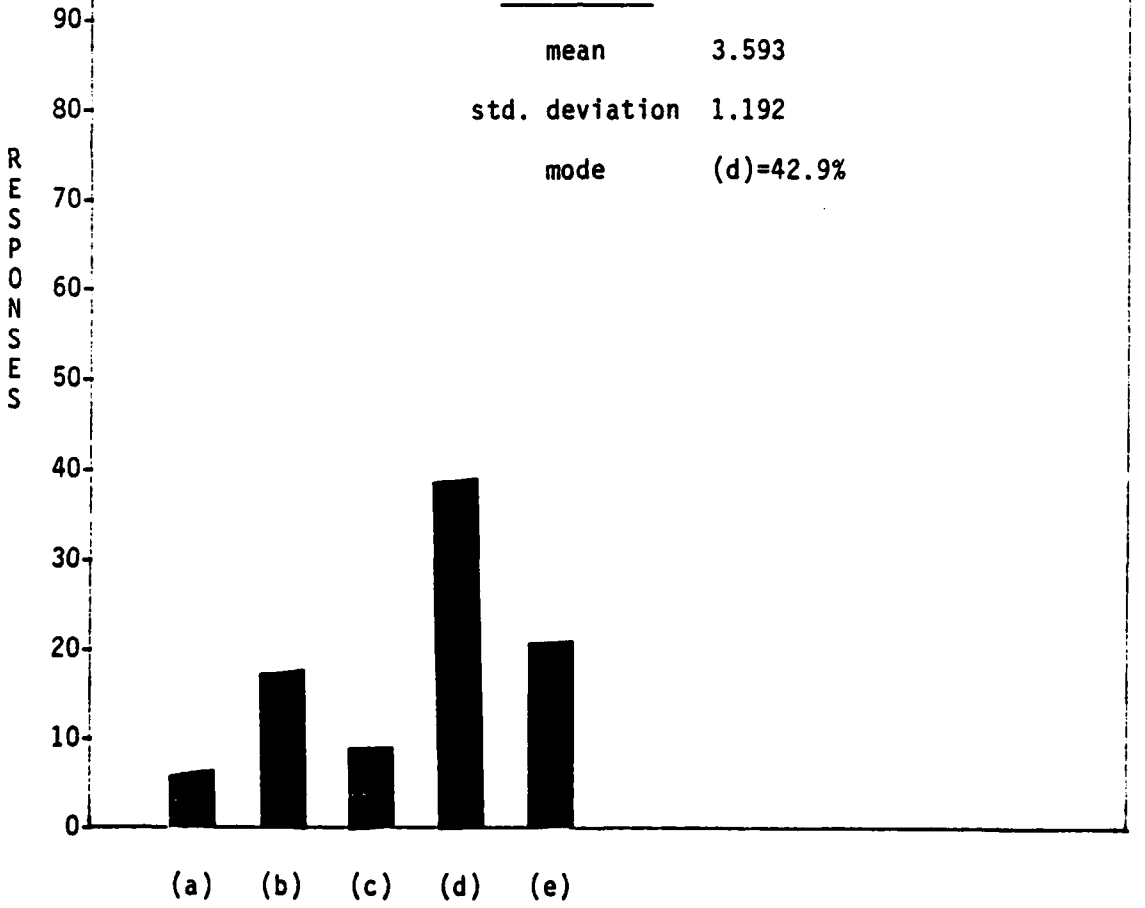
(c) Undecided

(d) Disagree

(e) Strongly disagree

STATISTICS

| | |
|---|---|
| mean | 3.593 |
| std. deviation | 1.192 |
| mode | (d)=42.9% |



Q.35. The quality of projects produced by the Engineering Branch has decreased with the shortage of majors and/or captains.

(a) Strongly agree

(b) Agree

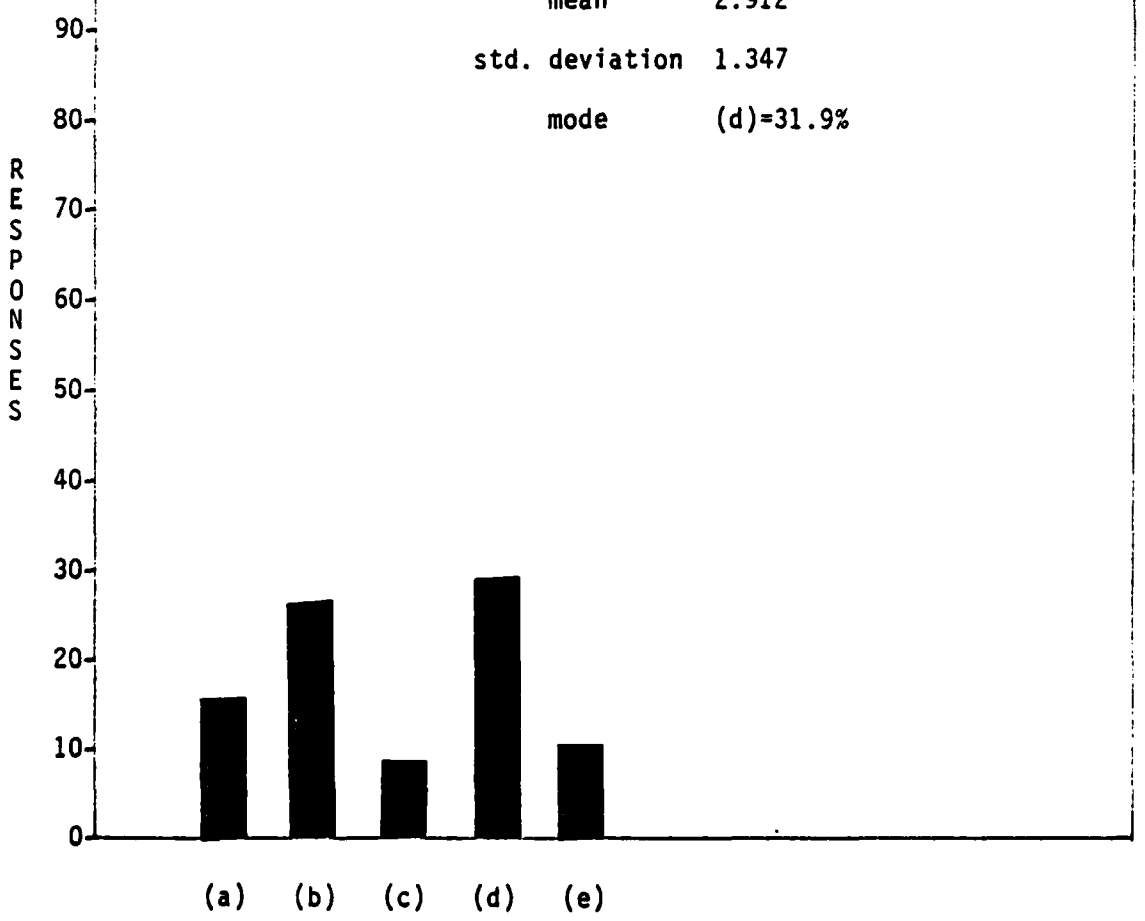
(c) Undecided

(d) Disagree

(e) Strongly disagree

STATISTICS

| | |
|---|---|
| mean | 2.912 |
| std. deviation | 1.347 |
| mode | (d)=31.9% |

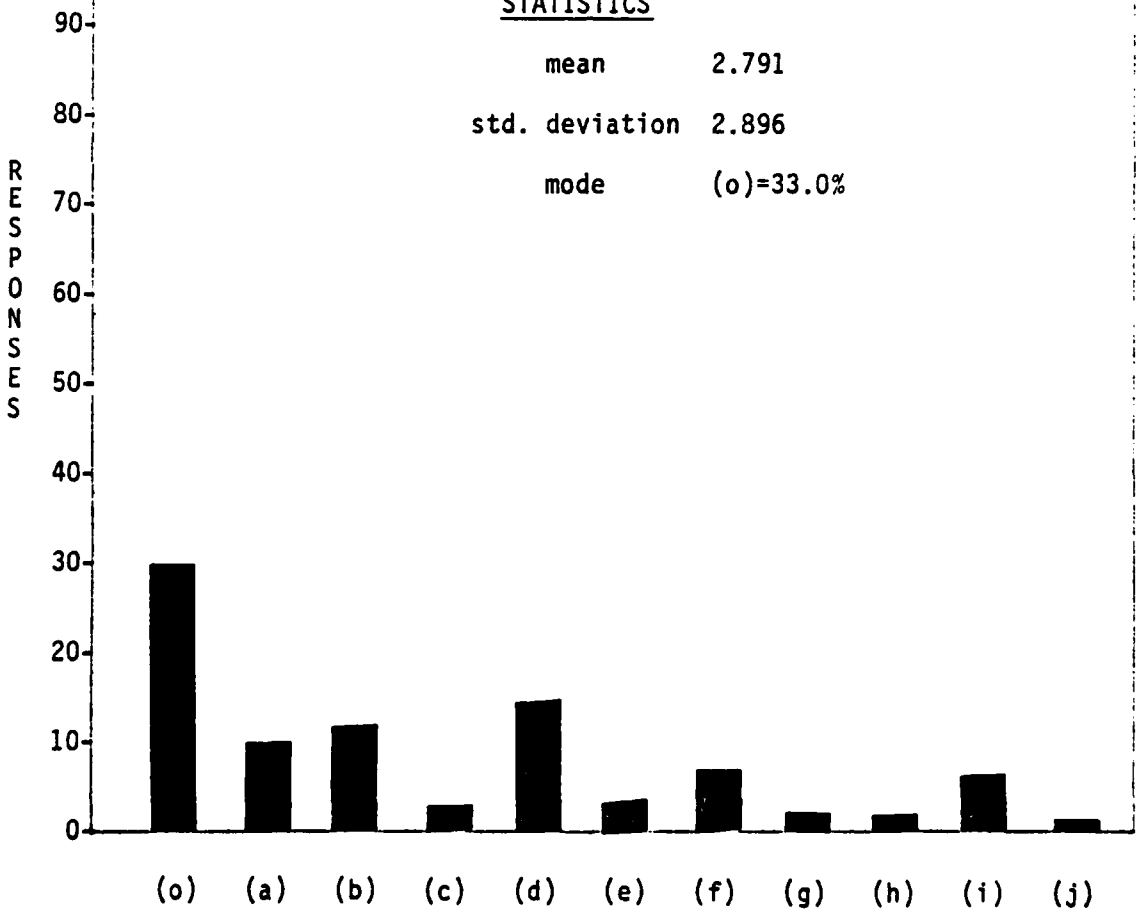


Q.36. What authorized captain position do you consider the least important in your organization? Why?

(o) None
(a) DEA
(b) DEE
(c) DEEC
(d) DEEE
(e) DEEV
(f) DEI
(g) DEM
(h) DEMR
(i) DEMRL
(j) Other

STATISTICS

| | |
|---|---|
| mean | 2.791 |
| std. deviation | 2.896 |
| mode | (o)=33.0% |

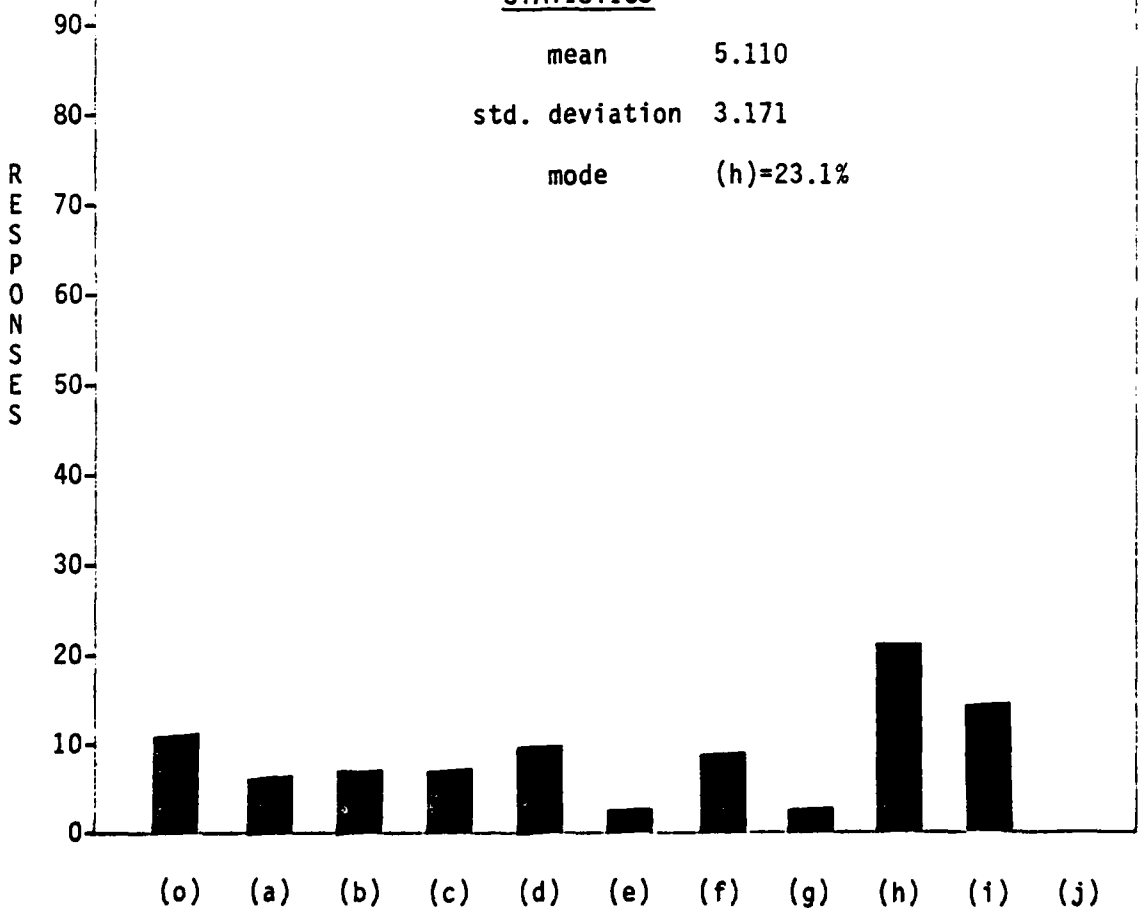


Q.37. What authorized captain position do you consider the most important? Why?

(o) None
(a) DEA
(b) DEE
(c) DEEC
(d) DEEE
(e) DEEV
(f) DEI
(g) DEM
(h) DEMR
(i) DEMRL
(j) Other

STATISTICS

| | |
|---|---|
| mean | 5.110 |
| std. deviation | 3.171 |
| mode | (h)=23.1% |



Q.38. What authorized major position do you consider the least important? Why?

(o) None

(a) DEE

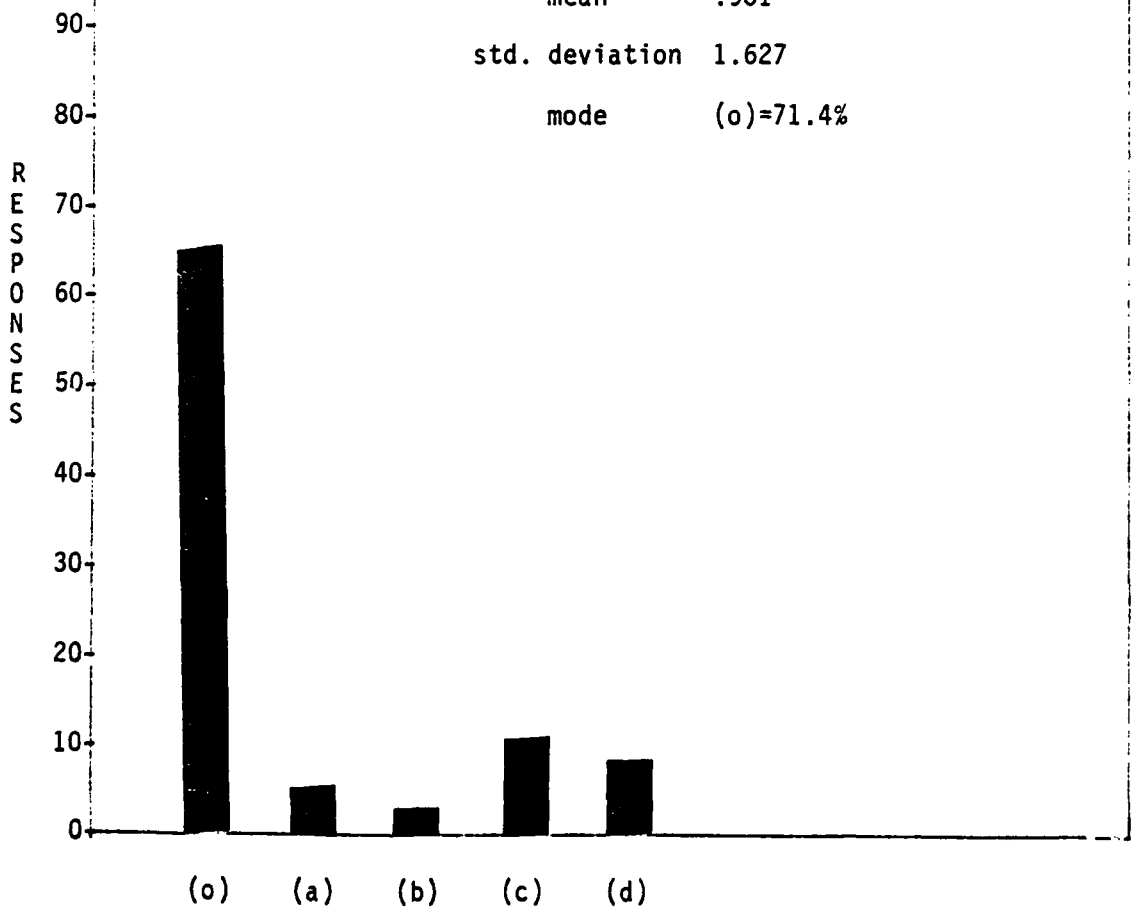
(b) DEI

(c) DEMR

(d) Other

STATISTICS

| | |
|---|---|
| mean | .901 |
| std. deviation | 1.627 |
| mode | (o)=71.4% |



Q.39. What authorized major position do you consider the most important? Why ?

(o) None

(a) DEE

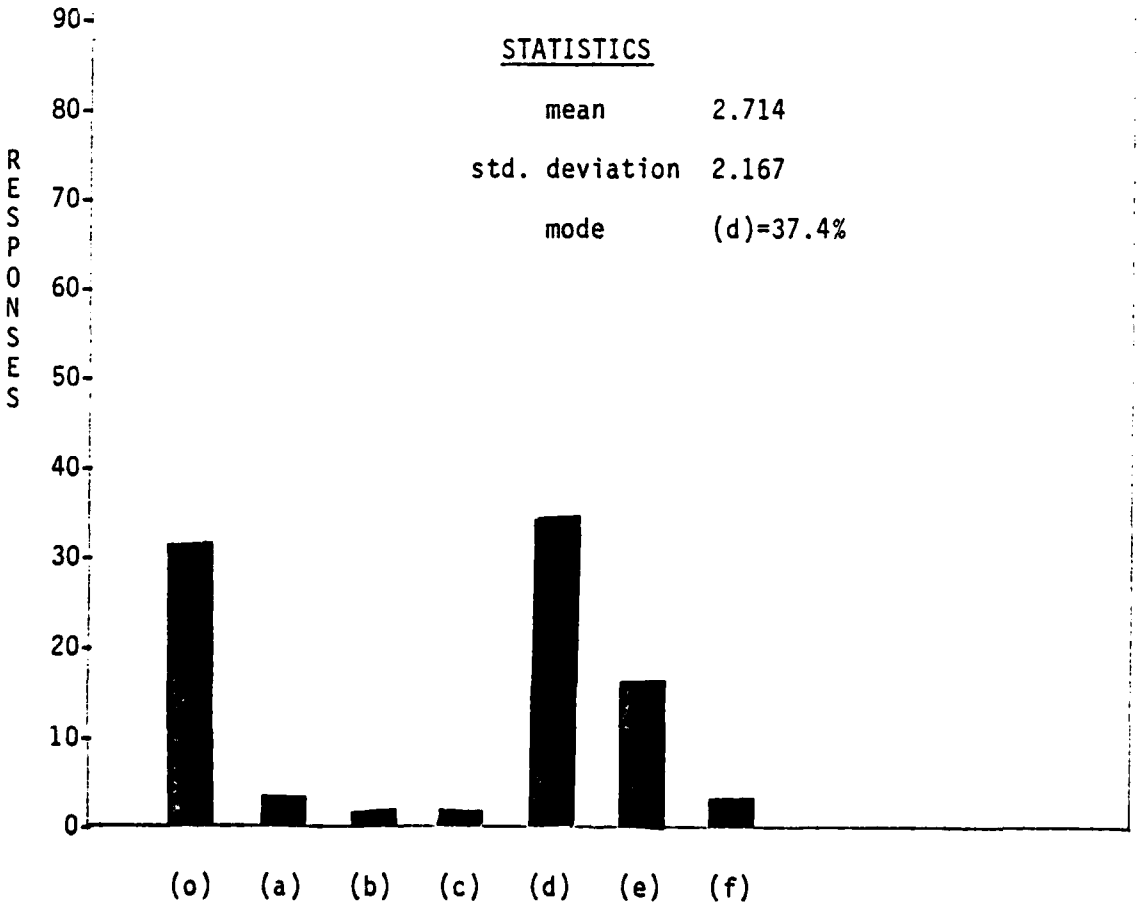
(b) DEEC

(c) DEEE

(d) DEM

(e) DEMR

(f) Other




STATISTICS

| | |
|---|---|
| mean | 2.714 |
| std. deviation | 2.167 |
| mode | (d)=37.4% |

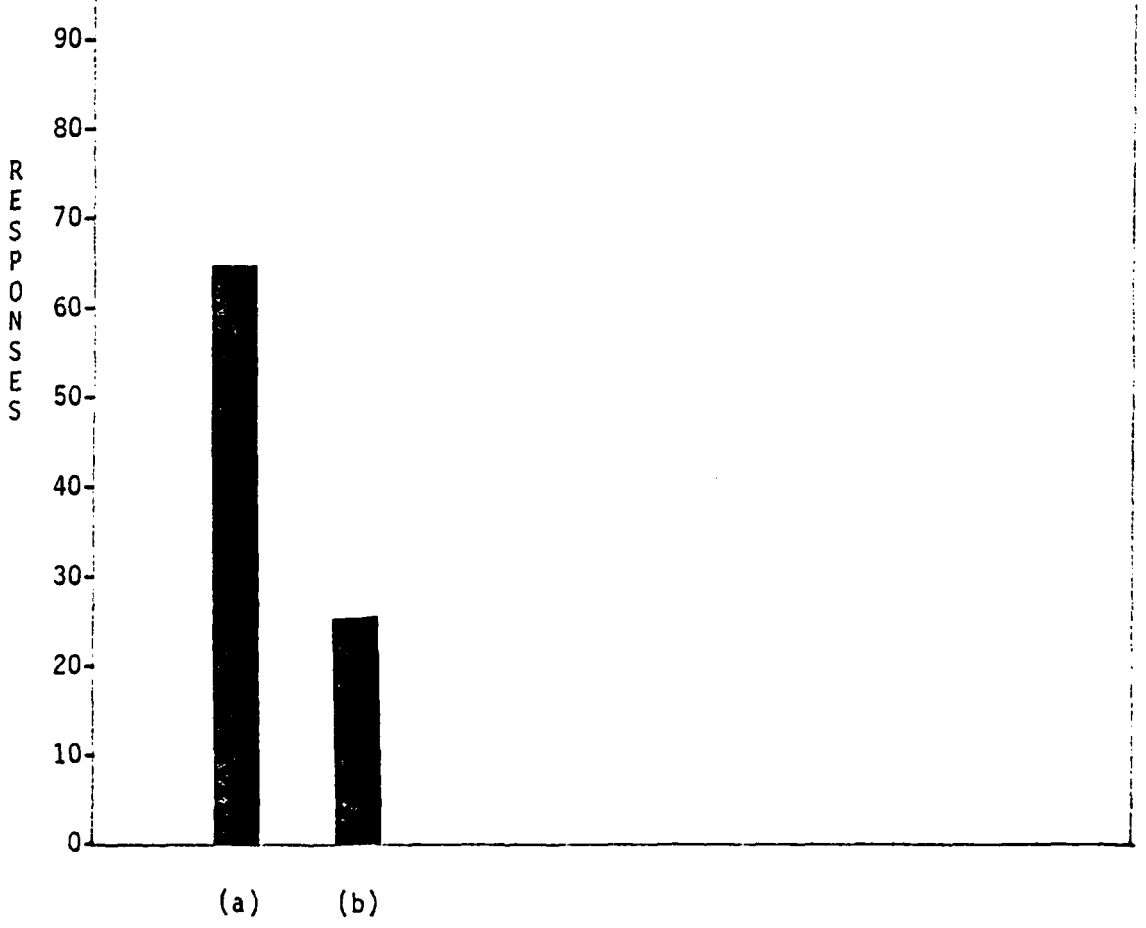
Q.40. Was the respondent a overseas or CONUS Base Civil Engineer?

(a) CONUS

(b) Overseas

STATISTICS

| | |
|---|---|
| mean | 1.286 |
| std. deviation | .454 |
| mode | (a)=71.4% |



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